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OCTOBER 1956

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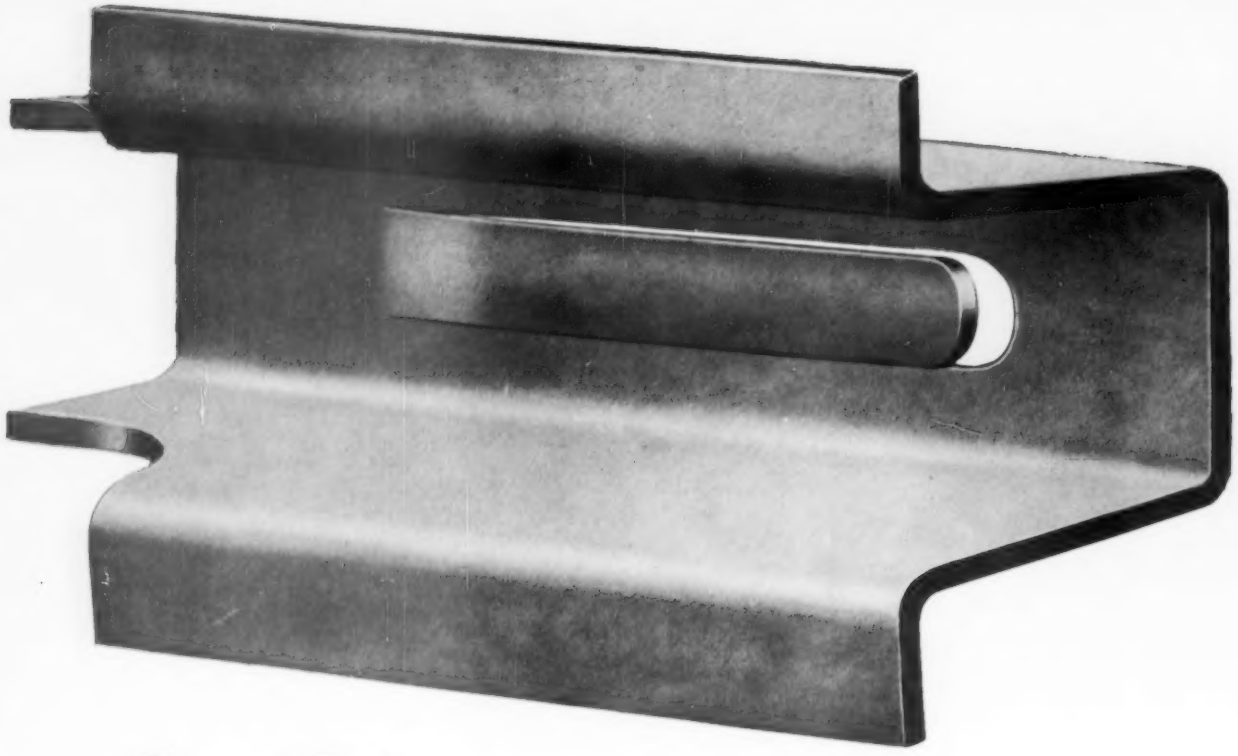

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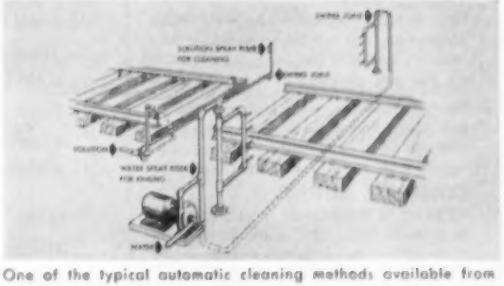

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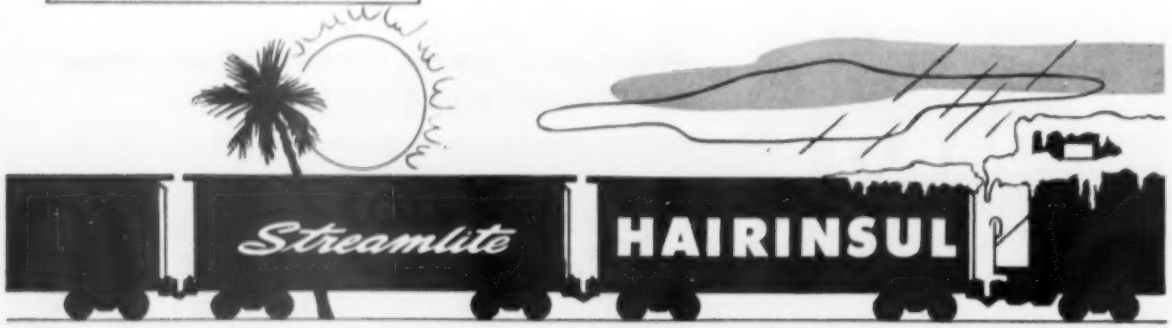

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Founded in 1832 as the American Rail-Road Journal

OCTOBER, 1956 VOLUME 130, No. 10

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READERS LAMENTS AND CHEERS . . . . . wherein readers tell what they like—and don't like

YOU GOT US THIS TIME . . .

Although we on the Erie continue to paint the box lids yellow on freight cars when lubricator pads are applied, you will note in the AAR Lubrication Manual, effective March 1, 1956, page 29, fifth paragraph, it states: *"Previous requirement that journal-box lids be painted yellow on cars equipped with lubricating devices has now been rescinded."*

L. S. Kurfess,
Assistant superintendent car department
Erie

Our thanks to Mr. Kurfess for calling attention to something that we should have known ourselves. The fact that we don't seem to have a copy of the manual mentioned is certainly not a good excuse. It only goes to show that you can't run a railroad right if the boys don't read the rules and we've found out through long experience that when we make a mistake we get called in a hurry. This time the "cokes" are on us.—EDITOR

AIRBRAKES SCHEMATICS

Wiring Diagrams, Too

The method of using colors in tracing the air-brake system, I believe, is a simplified method in learning this equipment. When diesel locomotives were first introduced to American railroads a great many mechanical officers attended the locomotive builders' diesel schools to familiarize all concerned in the operation of the locomotive electrical circuits. These circuits were traced by using a colored pencil method and, to this day, I find myself consulting these electrical diagrams and have found it very easy to trace these circuits without difficulty. This method would be helpful if applied to the air-brake system of the locomotive.

I might add that the magazine, Railway Locomotives and Cars, is something that I look forward to receiving each month as I have personally benefited by a number of articles that have been published.

C. P. Turner,
Supervisor diesel operation-maintenance
Lehigh Valley

KEEPING GOOD MEN

Where Do They Come From and Where Do They Go?

The editorial in the May issue, "Why Can't the Railroads Keep Good Men?", puts a finger on one of the more pressing problems of railroad management. Concisely put, the problem has two aspects: "How do we find the right man?" and "How do we keep him?" Answers to these questions are in greatest need in building the strength of the upper and middle management groups and, although a wide variety of answers have been and will be proposed, one assumption is gaining increasingly wide acceptance. The man, today, most likely to succeed is the man who has taken advantage of the ever-growing opportunities for a university education.

Studies of upper and middle management personnel in large organizations have clearly shown a majority of them to be university trained. It is only good sense to try to insure that in the course of time their positions will be occupied by men of at least equivalent education. Increasingly, then, the railroads have turned to the universities. The railroads, however, are not alone. The same needs have brought the majority of North American industries to the same conclusion. The railroads are not by any means the only industry "trying to sell the college man to the fact that there is a real future for him in the industry."

The fact is that the demand for college graduates has become so intense during the last two decades that there are not now enough to go around. As the article, "Twenty Minutes to a Career," in the March 1956 issue of "Fortune" pointed out, in one year (1955-56), the demand for graduates in engineering and applied science increased 47 per cent. Yet the supply of university graduates, tied as it is to the depression birth rate, has been declining.

The recruiting problem is not that of employing as many graduates as the organization needs, but rather that of signing on as many as it can get. The fact that, for most industries, a significant proportion of graduates hired leave within the first few years of employment, further aggravates an already annoying situation. "Fortune" cites a Northwestern University survey which reflects a 33% turnover of graduates during the first five years for a group of 126 companies. This last can only be put in proper perspective by determining how many graduates with prior experience in other firms are being hired to replace those leaving to join other firms. It is obvious that a great deal of this is going on and it is not easy to decide just who is the loser.

Editorially, Railway Locomotives and Cars suggests that the technical graduate turnover on many railroads may be considerably higher (50%) than the Northwestern University figure above. Whether it is or not, graduate turnover is still a serious problem. There is good reason to doubt, however, that "long hours and the necessity of frequent changes of location" is the only, or even the chief, cause of whatever difficulties the railroads are experiencing in recruiting and keeping college graduates. Certainly, the very low 5% turnover in the first two years claimed by the Pennsylvania does not support this argument. The low turnover rate for the Pennsylvania becomes more understandable when it is appreciated that their training programs for graduate engineers, as carried out by the maintenance-of-way and maintenance-of-equipment departments, have been in existence for more than 50 years. The 5% loss figure is the consequence of *long-established*, obviously *well-planned* three-year training program. The long history of this scheme has allowed ample time for its reputation and effects to become known to engineering undergraduates in its territory. The public relations impact of such a program has probably created a very favorable climate both for the recruitment of graduates and their retention, once employed.

Returning for a moment to the problem of frequent changes of location inherent in railroad employment, it is probable that both the petroleum and the chemical industries move their university graduates quite frequently during the first years of employment. Yet, in a survey of 626 college seniors drawn from 81 U. S. colleges, the Opinion Research Corporation of New Jersey* found that the petroleum and chemical industries both received over 85 per cent "good" and "very good" votes. The same students identified chances for advancement (92%) and interesting work (83%) as the most important factors in choosing a job. This same survey showed that these university students voted starting pay (23%) and benefits (17%) near the bottom of the lot of important factors. This casts an interesting light on the sometimes frantic juggling of starting salaries for graduates which has characterized campus recruiting in recent years.

The low percentage of votes that the railroad industry received for career opportunities hints at another of our problems. Where has the glamour gone in railroading? We, on the inside, cannot help but feel the excitement and challenge that modern railroading presents. Our public, apparently, feels otherwise. This is not the place to inquire why this should be so, but it is a factor that we have to contend with.

These considerations help to illustrate the general conditions under which the railroads, including the Canadian National, are attempting to recruit potential management personnel. Within these limits, our experience has been that the university graduates enter employment with us through at least four distinct routes. There are those who respond to advertisements for technical graduates appearing in mass media, such as daily newspapers. There are those who return to the system after some time spent in other employment. A third group is the "self-starters" who take the initiative by approaching us either in per-

* "How To Recruit the College Men You Want," Opinion Research Institute, Princeton, N.J., October 1955.

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son or by mail to make employment inquiries. And, finally, there is that group who are brought into employment as a result of on-campus recruitment programs. The statement was made in the "Fortune" article referred to above that . . . "practically all engineering students are hired by recruiting." This may be true of industry in general; it may be true even for the railroad industry in particular, but it is not true for the Canadian National. A sampling of recently engaged engineering graduates shows that about one-third of them accepted employment as a result of on-campus recruitment, and an additional third joined in response to advertisements.

It is probably true that the majority of special problems which the Canadian National encounters in the recruitment of university graduates are products of the sheer physical size of the organization. Our attempts to provide centralized coordination for on-campus recruiting through the personnel department date from 1952, and the administrative difficulties involved are still with us to some extent. They stem from the fact that eight regional employment offices and eleven universities—from Nova Scotia Technical College in the east to the University of British Columbia in the west—participate in this program.

It is doubtful that any of the Canadian National personnel policies, as they apply to university graduates, are unique. Three programs that may deserve special mention, because we are confident that they are acting as incentives to our college-trained personnel, are these. First, engineering undergraduates are offered summer employment as student engineers. Providing both the student and the employer with an opportunity to appraise one another, this program provides for higher starting salaries upon graduation for the engineer who has completed one or more summers in our employ. In our experience a significant proportion of those graduate engineers who accept employment with the Canadian National through on-campus recruitment are former student engineers. Second, our job evaluation program. Members of our interviewing teams have reported that students and graduates who were informed of this program reacted very favorably. The assurance that a determined effort is being made to establish and maintain equitable salary scales is something that university graduates understand and appreciate. The third factor is our personnel appraisal program. This activity, emphasizing the person rather than the position, helps to reassure the graduate that he, as an individual, is not going to be submerged in this complex organization.

The editorial in the May issue stated in part that "To the man who knows what he wants to do and has a real goal, the chances of attaining a position of importance and satisfactory remuneration is just as great in the railroad industry as elsewhere." We of the Canadian National are fully in agreement with that statement. Our problem, as a member of the railroad industry, is to persuade the university graduate of the truth of this and to insure that it remains true.

W. T. Wilson,
Assistant vice-president, personnel, Canadian National

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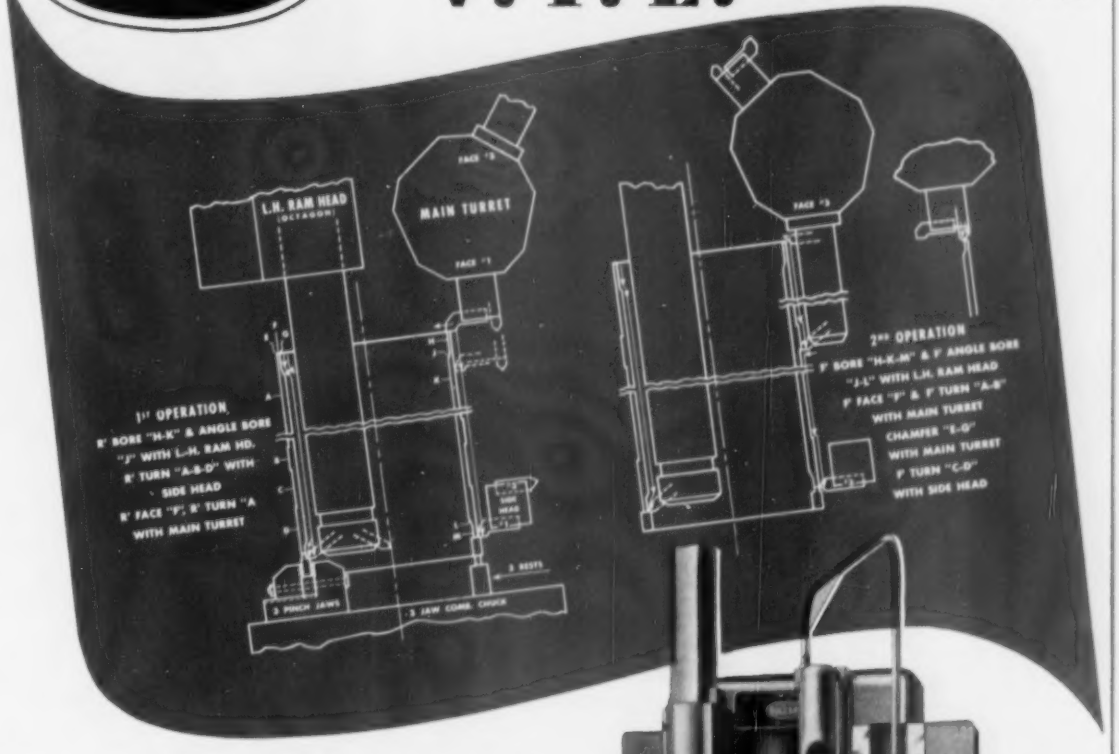
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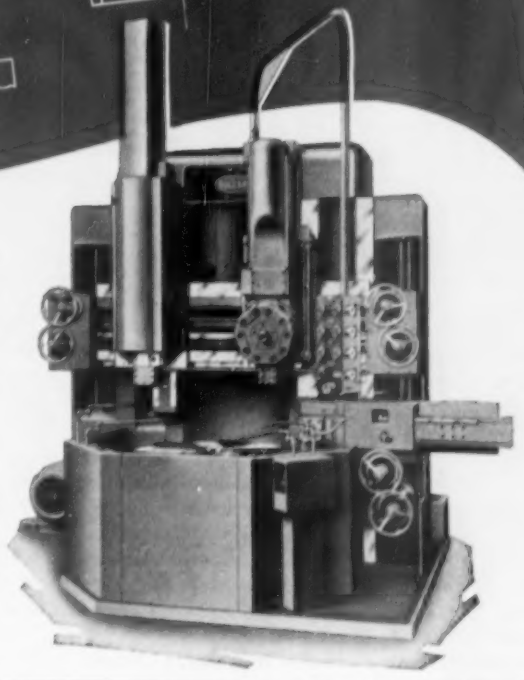
8" FACE "F", 8" TURN "A WITH MAIN TURRET
3 PINCH JAWS
3 JAW COMB. CHUCK
2ND OPERATION
8" BORE "H-K-M" & 8" ANGLE BORE "J-L" WITH L.H. RAM HEAD
8" FACE "F" & 8" TURN "A-B" WITH MAIN TURRET
CHAMFER "E-G" WITH MAIN TURRET
8" TURN "C-D" WITH SIDE HEAD



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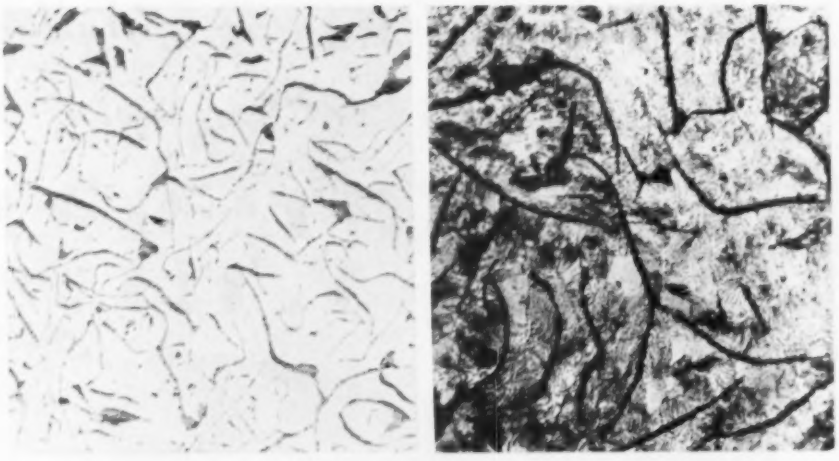
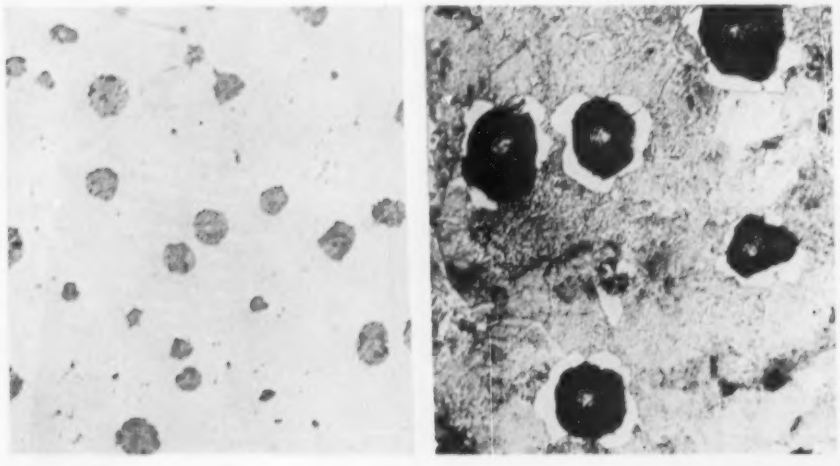
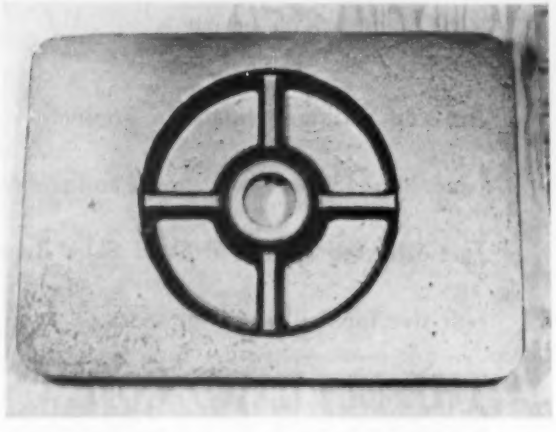
Ductile Iron— A New Railroad Material



► Left: Photomicrograph showing flake graphite in gray iron at 100X magnification. Right: Flake graphite seen in gray iron at 250X magnification.



◄ Left: Photomicrograph showing spheroidal graphite in ductile iron at 100X magnification. Right: Spheroidal graphite seen in ductile iron at 250X magnification.



▼ More than 2,500 of these center plates are now in service.

For at least the past 50 years the gray iron foundry industry has been striving for a castable material containing free graphite which would possess ductility similar to steel.

The International Nickel Company found that by treating gray irons within certain prescribed limits of composition with magnesium the graphite would be present in the form of spheroids instead of the flakes found in ordinary irons. By so doing, the weakening and embrittling effect of these flakes was removed and a far stronger and tougher and more ductile material was attained.

This new material, ductile iron, represents a family of cast ferrous materials and metallurgically bridges the gap between cast iron and cast steel. These new materials possess the major advantages generally attributed to cast iron; namely, good fluidity, castability, wear resistance and corrosion resistance coupled with ease of machining, plus the strength, toughness and ductility associated with steel.

Unlike gray irons, ductile iron has a definite yield strength, appreciable ductility and a definite modulus of elasticity. The stress-strain curves are similar to those exhibited by steel and the offset method may be used to

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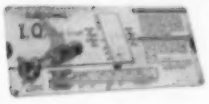

NATIONAL'S IQ SLIDE GRAPH shows total work done in foot-pounds during impacts between various cars at various speeds! Shows how much of this work National Draft Gears account for at various force levels! Points up need for high capacity in draft gears! Available on request.

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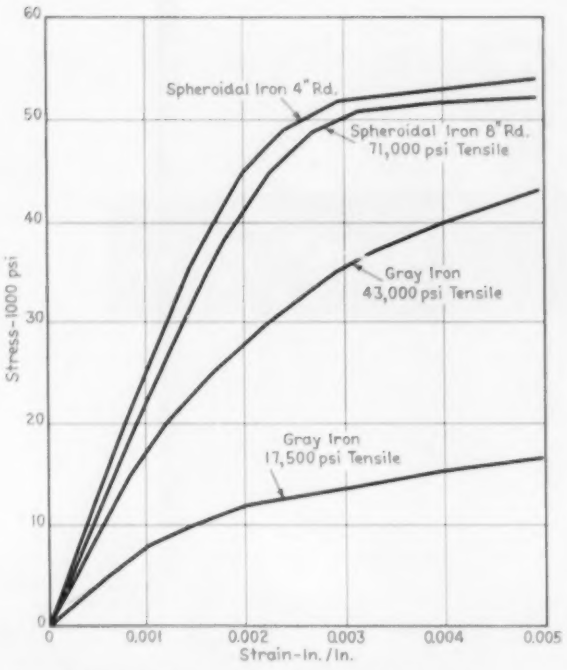
80-60-03	80/100,000	60/75,000	3/10	200/270	15/65
100/70/03	100/120,000	70/90,000	3/10	240/300	35/50
120/90/02	120/150,000	90/125,000	2/7	270/350	25/40
Heat resistant*	60/100,000	45/75,000	0/20	140/300	5/115

*Typical composition range: T. C. 2.8/3.8%, Si 2.5/6.0%, Mn 0.20/0.60%, P 0.10% max., Ni 0/1.5%. Although resistance to oxidation increases with silicon content and is excellent at 6% Si, most castings are purchased at 3.0/4.5% Si which provides the best compromise between mechanical properties and oxidation resistance. This grade is not recommended for applications involving severe thermal shock.



Comparative stress-strain curves for ductile and gray iron.

determine the yield strength when so desired.

Many design engineers have recognized the advantages of ductile iron and have effected economics by specifying it in applications which, previous to its discovery, may have required more expensive ferrous or nonferrous castings, weldments or forgings.

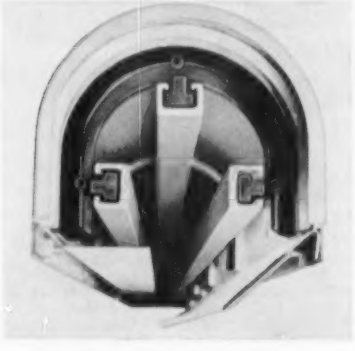
Up to the present time, more than 50 different parts have been placed in railroad service test. The majority of these are small miscellaneous castings which replace either malleable iron or cast steel. One of the larger castings now in service is ductile iron freight-car center plates, 2,500 of which have been in non-interchange service on one of the western railroads for four years with no record of any having been removed from service on account of wear or other failure. The AAR has authorized an interchange service test of 100 car sets of these castings to confirm the suitability for this application.

Examples of what can be done with this material were demonstrated by the Hunt-Spiller Corporation who redesigned an aluminum railroad diesel engine piston in ductile iron with only a 3% increase in weight. These pistons were service tested and found to give 33% longer life than the original aluminum design. One of the passenger-car builders has also redesigned the end coatings for a series of cars now under construction to take advantage of the excellent castability and strength of ductile iron and to save several hundred pounds per car.

It is felt that the properties of ductile iron are such as to make it an ideal material for many railroad applications. With more than 120 producing foundries throughout the United States, the material should be readily available to all railroads. *Development and Research Division, International Nickel Company. Dept. RLC, 67 Wall street, New York 7.*

Enclosed Trolley Busway System

Lec-Trol-Feed, a trolley busway system for cranes, hoists, welding equipment, and other moving units delivers 300 amp voltages up to 575 ac or 250 dc. Three aluminum bus bars, arranged in a delta pattern, are completely enclosed in an aluminized steel housing. Maximum electrical leakage distance is provided by the delta conductor arrangement and petticoat-ribbed insulators. Bottom safety covers prevent accidental contact from below with current-carrying members.



The system, designed for straight runways, may be used in or outdoors under most operating conditions. Track sections are 30 ft long, and the trolley capacities are 100, 200, and 300 amp. *Electric Service Manufacturing Company, Dept. RLC, 17th and Cambria streets, Philadelphia 32.*

Double-Drum Car Puller

According to the manufacturer, moving and spotting of freight cars on railroad sidings, and barges on dock sides, is simpler and safer through the use of

Cuts down "DRAG"... cuts operator fatigue

No more energy wasted on handling heavier, less flexible welding cables. U. S. Royal Gold *Fluted* Welding Cable not only cuts down "drag" and operator fatigue, but also facilitates welding in cramped quarters.

HIGH VISIBILITY!

EXCLUSIVE! U. S. Royal Gold's unique yellow jacket of 60% natural rubber provides unbeatable visibility, reduces the hazard of accident which is present with *black* cable. Also, the yellow provides contrasting color to black for conductor identification when two cables are used on welding machines.

LONGER LIFE! The greater flexibility of U. S. Royal Gold means greater dependability at terminal connections, minimum maintenance. Higher visibility reduces danger of accidental damage, adds more life to cable.

COOLER TO HANDLE! The unusual *fluted* jacket provides greater surface area and thereby dissipates heat faster.

SUPERIOR IMPACT RESISTANCE! Proved by tests to be greater than that of conventional constructions.

GREATER MOISTURE RESISTANCE! That's because of the special 60% natural rubber insulation. Added protection is provided by the jacket, also of 60% natural rubber. Get U. S. Royal Gold at electrical supply houses.

Free Folder Gives Facts demonstrating the superiority of U. S. Royal Gold Fluted Welding Cable. Write to us for your copy at Rockefeller Center, New York 20, N. Y.

US RUBBER

Electrical Wire & Cable Department

United States Rubber

this two-way car puller, which consists of two cable drums, driven by an electric motor through a triple reduction herringbone gear reducer and reversing mechanism. To move a car, or cars, a hook is simply slipped over a car sill or through the conventional car coupling, and the puller operated in forward or reverse, by pushbuttons.

The car hook can be moved into position by the motor-driven cable rather than by man power. The absence of V-belts or chain drives reduces chance of injury to operating personnel. A built-in electric limit switch automatically shuts the motor off at the extreme ends of the cable travel. Roller-bearing mounted and completely enclosed gears operate in an oil bath. Clutch sleeves and shifting elements are protected by flexible bellows-type guards, preventing rust and abrasive wear. *Hewitt-Robins Incorporated, Dept. RLC, Stamford, Conn.*

Dial Indicator Gage

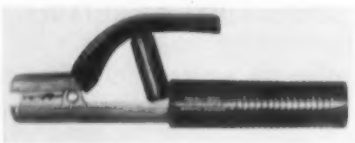
According to the manufacturer, two new series of dial indicator gages for measuring the wheel diameters of railroad axles and wheel bores give a higher degree of accuracy plus greater gaging speed than is possible with fixed type gages.

One series, the Model 264 P-400, can be used to measure the wheel seat diameter of the axles. Each gage is adjustable to measure two sizes of axles. Five sizes of snap gages in the series cover axle sizes from 4⅝ in. through 8⅞ in. The gages are said to be sturdy enough to withstand hard daily use. Gaging contacts are made of tungsten carbide to give maximum wear. It is possible to set the gages with conventional micrometers and transfer them to the radiused surface of the hole with no significant error. *Federal Products Corporation, Dept. RLC, 1144 Eddy street, Providence, R.I.*

Passenger-Car Water Protection

The automatic ClorDolor system consists of a Modle R Everclor automatic chlorinator at each car water tank and an Everpure water purifier at each drinking water cooler and in each dining car kitchen. The device is actuated by the train air supply and automatically feeds a measured amount of sodium hypochlorite to the car water tank each time water is put aboard. The dosage is regulated to kill bacteria, algae and other organisms throughout the entire water system and to leave sufficient residual to take care of any emergency contamination which may occur. This superchlorination of the entire water supply is said to safeguard the drinking water under all conditions, improve sanitation, and kill bad odors in lavatories and kitchens.

The ClorDolor system was developed for the Santa Fe and first used on its "El Capitan" cars about three years ago. It is in use on the new high-level "El Capitan" cars recently put into service. *Tested Appliance Company, Dept RA, 2627 West 19th st., Chicago 8.*



Electrode Holder

The AL-300 Tewcotong holder has a body and upper lever made of high conductivity aluminum forgings. The unit weighs 13½ oz, and will handle 300 amp electrodes of 1/16 to ¼ in. diameter.

Forgings of the metal parts gives the holder high tensile strength and increases conductivity where it surpasses copper castings. Both the upper and lower replaceable jaws are of copper, cadmium plated to resist corrosion and prevent weld splatter from sticking to the jaws.

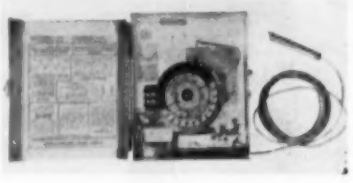
The holder will take any size cable from No 6 through 3/0. This welding cable is easily attached by baring the cable end and inserting it into the reamed hole in the holder body. The jaws and body are insulated with many layers of glass cloth bonded together with a Melamine resin. *Tweco Products Company, Dept. RLC, P. O. Box 666, Wichita 1 Kan.*

Degreasing Fluid

Permacel 345, a self-emulsifying degreasing agent, can be used for the degreasing of diesel engines, cleaning undercarriages of trucks and cars and for cleaning parts and tools. For most applications, the formulation is cut with 8 parts kerosene or light fuel oil. It is never used in the concentrated form.

The product can be sprayed or brushed upon parts to be cleaned and then hosed down with water after a 20-minute period. As the emulsified material flows on the floor, it will help clean the floor and degrease drain pipes and traps.

It is available in 1-qt and 1-gal cans and 5-, 15-, and 55-gal drums. *Permacel Tape Corporation, Dept. RLC, New Brunswick, N.J.*



Heating Cycle Time Switch

The Weather-Chron, containing two circuits, automatically regulates the hours of building heating and divides the day into three periods of heating. The first circuit operates the burner or valve, with only the safety high-limit controller in the circuit regulating heat generation or flow. At a preselected time, the second switch of the timer connects the daytime heat controller with the circuit to provide a regulated heat flow throughout the day. Heat flow is stopped, or reduced, at a preselected nighttime hour.

A safety feature automatically eliminates night setback operation when outdoor temperature drops below a preselected safe low level such as 10 deg F. The switch also stops all heat input when temperatures rise above a selected minimum or 65 deg F.

One-day or seven-day models are avail-

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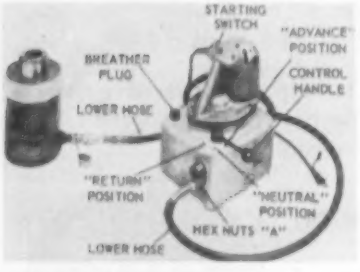
able. The seven-day programming feature automatically adjusts the hours of building heating individually for each day of the week. All models are equipped with a clock motor containing a built-in spring, which provides up to 30 hours of carry-over in case of current outage. *Automatic Devices Co., Inc., Dept. RLC, 714 Hillgrove avenue, Western Springs, Ill.*

General Purpose Floodlight

Less weight, better performance and increased flexibility are features of the L-69A general purpose floodlight. It is designed for three different beam selections —wide angle for maximum dispersion, medium for the middle range illumination, and the narrow beam for concentrated light.

The 17-lb unit may be readily mounted horizontally, or with the aid of a built-in wrench positioned vertically. *General Electric Company, Dept. RLC, Schenectady 5, N. Y.*

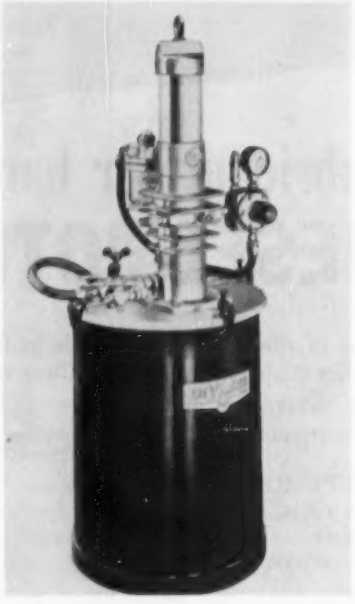


Electric Hydraulic Power Pump

This device, No. 798CO, will raise a 60-ton capacity Simplex Re-Mo-Trol ram five times faster than a hand pump. It has a displacement of 30 cu in. of oil per min at 10,000 psi.

When used with single or two-way rams, the pump provides combination units with capacities from 10 to 100 tons for lifting, pushing or pulling heavy loads. The set-up exerts force in any direction, while the operator remains a safe distance away.

It has a built-in ½-hp, 115-volt, universal motor and a 2-speed automatic changeover. Also furnished is a safety by-pass valve and a selector valve which reverses the plunger on two-way rams. The oil reservoir holds 6 qt full, with 4½ qt working capacity. *Templeton, Kenley & Co., Dept. RLC, 2525 Gardner road, Broadview, Ill.*

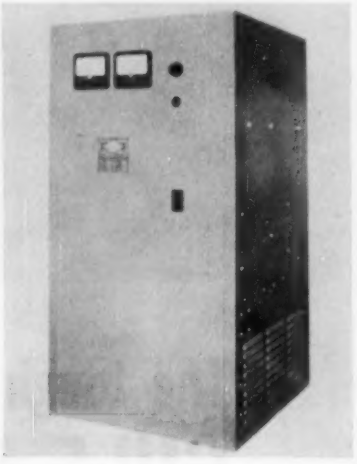


Portable Paint Pump

This paint handling device has been built with materials resistant to solvents found in paints. It is said to be ideal for use in a large or small circulating system. The pump, P-QBF, is made in several models to fit individual needs. They will handle material direct from a 55 gal drum, eliminating the need for frequent refills and reducing spillage and wasted paint. One model has a 10-gal hinged lid tank.

Operated by compressed air, it requires no wiring. Air consumption is low with less than 100 lb pressure required for volume discharge. In operation, the double action pump, delivering material on both the up and down stroke, provides a constant supply of fluid. As many as 18 spray guns can be supplied with more than 1 qt of material per min.

The pump is equipped with a controlled by-pass for the recirculation of paint. Lubrication is accomplished automatically by a mist-type oiler which controls the oil introduced into the pump motor. *DeVilbiss Company, Dept. RLC, 300 Phillips avenue, Toledo 1.*



Automatic Battery Chargers

These chargers are completely automatic in operation. They extend battery life and reduce maintenance, because gassing and water loss are eliminated, and prevent over or undercharge of batteries.

The rectifier power circuit is full wave. Its automatic regulation circuit consists of a high gain magnetic amplifier which provides output regulation to within plus or minus 1 per cent. Input line voltage changes of plus to minus 10 per cent are automatically regulated.

The selenium rectifier stacks have inorganic, non-oxidizing barrier layers which are corrosion and moisture proof and are capable of continuous full load operation in 55 deg C ambient temperature without deterioration. Lack of moving parts is said to assure trouble-free operation. They are available in 3, 6, 12, 30 and 60 amp models. *Walker Division, Norma-Hoffman Bearings Corporation, Dept. RLC, Stamford, Conn.*

Flange Reducing Tool

The device, according to the manufacturer, reduces wheel flanges in one operation with one operator in a matter of minutes. The entire operation can be performed any-

(Continued on page 88)

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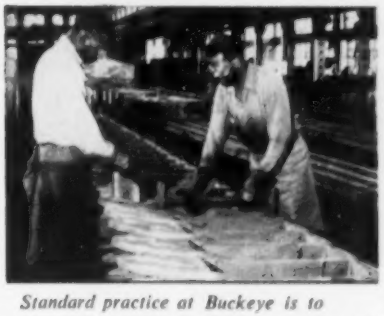

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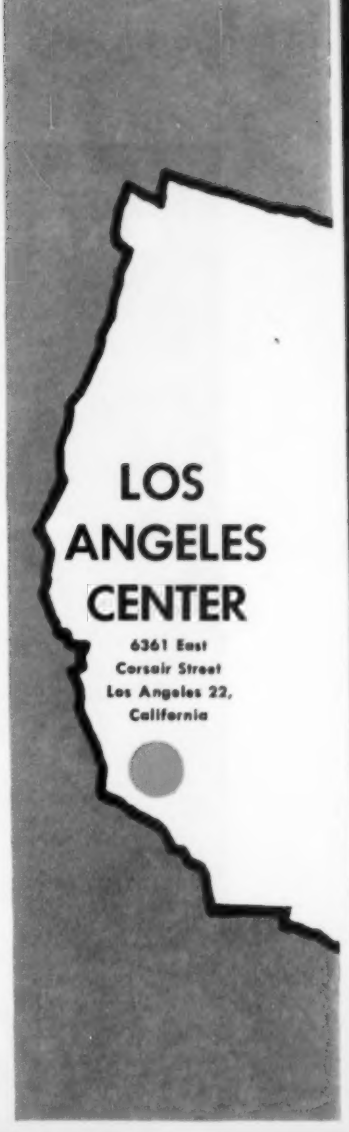
Locomotive & Car Equipment Dept., General Electric Co., Erie, Pa. 128-30



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G.E.'s five Parts Centers can quickly fill parts orders from locomotive builders using G-E equipment or from railroads with General Electric rolling stock.

Standard Cars Should Cut Costs

Standardization can be the key to reduced freight and passenger car costs in the future, Rock Island President Downing B. Jenks declared while addressing the Coordinated Mechanical Associations which met in Chicago on September 10, 11 and 12. Mr. Jenks said car builders must get on some kind of a basis where the cost of freight and passenger cars can be drastically reduced. "But it will take your cooperation to make that possible," he advised the mechanical officers.

The Rock Island president pointed out that in 1940 his road paid $117 per horsepower for diesel units, and by 1955 the per horsepower cost was down to $105. Meanwhile, he said, steel box cars were increasing in price from 67 cents per cu ft of capacity to $1.51.

The diesel locomotive, Mr. Jenks added, was something that could be produced on a production-line basis, and this spelled the end of the costly tailoring that had prevailed with steam power. "Mass production of the diesel made that type of motive power so inexpensive that railroads could not afford to pass it up," he declared. "In the same way, standardized freight and passenger cars can be made so inexpensive that railroads will find it inadvisable to develop special units of their own."

Standardized cars, Mr. Jenks continued, will offer a host of advantages to the railroads, including lower cost. He predicted that if a road were to retire a few cars, replacements could be obtained at "standard cost for early delivery, eliminating the need to build up a large-volume replacement order.

In addition, Mr. Jenks said, builders would be able to carry inventories of steel and special parts, and would have added incentive to step up research into basic car design. Asserting that standardization should not be allowed to stultify progress, however, he suggested that builders develop "new models" as in automobile production to keep car fleets in line with the needs of patrons.

Another "dream," Mr. Jenks said, is the possibility of semi-permanent sides and ends for box cars and gondolas to permit major body changes without tying up expensive investments in trucks and underframes for long periods.

John M. Budd, Great Northern president, spoke at a meeting of the Car Department Officers Association. Speakers at sessions of the Locomotive Maintenance Officers' Association included W. M. Keller, executive vice-chairman and director of research, AAR Mechanical Division, and J. A. Hall, director of locomotive inspection, ICC.

"In order to compete in a free market where the rewards go to those who are the most flexible and who can adjust quickly to changes, we must have a supervisory force of adaptable people," R. Glenn Chestnut, assistant to the vice-president of operation, Canadian National, told the Railway Fuel and Traveling Engineers.

While addressing the group on the subject of supervisory development, Mr. Chestnut said: "An innovation becomes an increasingly important concern of railway management, all members of management teams, and that includes everyone from the first-line supervisor up, will be called upon to develop and to exercise qualities which were not so important in former times." The emphasis on technological development and innovation is of great importance to the railways as a means of bringing about reductions in operating costs so that they may compete successfully with other transportation forms, said Mr. Chestnut.

"Therefore, we must develop supervisors at all levels who will not be content merely with doing as their predecessors did, or with the standards of the past," he said, "but who will be constantly looking for improved ways of doing things and who will readily accept the good ideas of others whether they come down from the ranks above, or up from the ranks below."

Mr. Chestnut concluded by declaring that "in the final analysis the quality of railway organization depends upon the quality of its supervisory ranks, and it should be the concern of each supervisor to insure that those ranks are reserved for men of talent."

A more complete story on the meetings of the coordinated associations, of which the Air Brake Association is also a part, will appear in the November issue of Railway Locomotives and Cars.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of June 1956	Month of June 1955	6 months ended with June 1956	6 months ended with June 1955
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	3,911	5,777	24,452	30,614
3-06	Total, Diesel-electric	37,354	35,717	224,238	207,321
3-07	Total, electric	744	749	4,413	4,356
3-04	Total, locomotive-miles	42,262	42,450	254,500	243,538
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,700	1,708	10,165	9,710
4-06	Empty, total	947	934	5,636	5,405
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	9,790	13,087	61,329	70,821
6-02	Total in oil-burning steam locomotive trains	1,237	2,901	6,012	10,016
6-03	Total in Diesel-electric locomotive trains	108,722	102,155	644,474	586,050
6-04	Total in electric locomotive trains	2,347	2,359	13,561	13,371
6-06	Total in all trains	122,994	121,180	730,406	684,470
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.03	1.03	1.02
10-02	Loaded freight car-miles	43.2	43.3	42.9	42.7
10-03	Empty freight car-miles	24.0	23.6	23.8	23.8
10-04	Total freight car-miles (excluding caboose)	67.2	66.9	66.7	66.5
10-05	Gross ton-miles (excluding locomotive and tender)	3,125	3,071	3,082	3,013
10-06	Net ton-miles	1,432	1,395	1,412	1,355
12	Net ton-miles per loaded car-mile (M-211)	33.2	32.2	32.9	31.7
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.2	64.6	64.3	64.2
14	Averages per train hour (M-211):				
14-01	Train miles	18.4	18.5	18.6	18.9
14-02	Gross ton-miles (excluding locomotive and tender)	56,950	56,179	56,851	56,234
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	47.8	48.7	47.2	46.1
14-02	All	46.1	46.0	45.4	43.4
15	Average net ton-miles per freight car-day (M-240)	981	959	961	884
17	Per cent of home cars of total freight cars on the line (M-240)	41.7	44.5	41.7	48.5

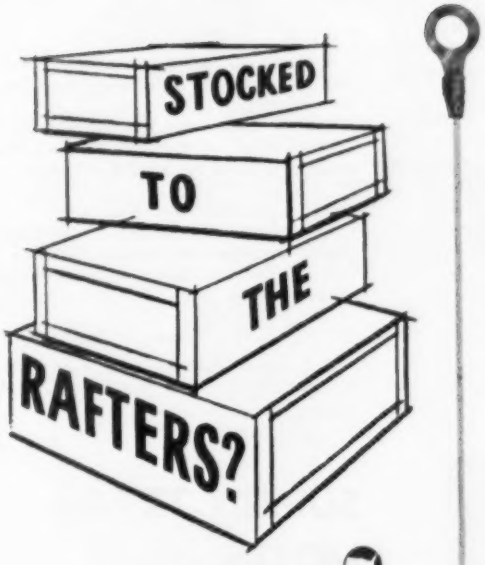
PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	731	1,430	4,807	8,368
3-06	Diesel-electric	20,214	20,141	121,586	120,936
3-07	Electric	1,212	1,257	7,617	7,916
3-04	Total	22,157	22,833	134,010	137,226
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	233,868	235,985	1,378,271	1,391,093
4-09	Total in coal-burning steam locomotive trains	4,349	7,730	29,141	47,644
4-10	Total in oil-burning steam locomotive trains	1,965	5,847	10,063	23,842
4-11	Total in Diesel-electric locomotive trains	213,179	208,010	1,248,208	1,228,632
12	Total car-miles per train-mile	10.11	9.91	9.86	9.74

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1-01	Steam, coal-burning	242,308	300,172	1,497,972	1,594,389
1-02	Steam, oil-burning	35,433	60,799	179,619	268,511
1-03	Diesel-electric[1]	3,800,099	3,669,170	23,097,950	21,235,851
1-06	Total	4,081,032	4,036,475	24,795,015	23,138,588
2	Passenger yard switching hours:				
2-01	Steam, coal-burning	5,005	7,043	36,998	53,842
2-02	Steam, oil-burning	3,569	5,482	18,698	30,234
2-03	Diesel-electric[1]	244,068	240,116	1,485,243	1,456,489
2-06	Total	276,150	277,935	1,692,923	1,694,082
3	Hours per yard locomotive-day:				
3-01	Steam	6.7	6.3	6.2	5.2
3-02	Diesel-electric	16.1	5.9	16.0	15.4
3-05	Serviceable	16.0	15.6	16.0	15.1
3-06	All locomotives (serviceable, unserviceable and stored)	14.7	14.0	14.5	13.3
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.66	1.64	1.69	1.65
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.73	73	.76	.75

[1]Excludes B and trailing A units.



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Union Wins Mechanical Group on P&LE

Mechanical department foremen and supervisors of mechanics on the Pittsburgh & Lake Erie—previously not represented by any organization—have voted in favor of representation by the American Railway Supervisors Association.

The National Mediation Board has so certified following an election on the property. According to the board, 53 of the 73 eligible foremen-supervisors voted in favor of affiliation with ARSA. Nineteen other ballots were ruled "void."

Meanwhile, on the Delaware & Hudson, the Mediation Board announced it has withdrawn from a case similar to that on the P&LE at the request of ARSA.

Personal Mention

C. C. Cowden

Canadian National

Quebec District

L. P. TROTIER, district car foreman, Quebec District, appointed assistant superintendent car equipment. Former position abolished.

I. W. SHEPHERD appointed superintendent of mechanical maintenance. Jurisdiction, system; headquarters, Montreal.

G. C. FULCHER, electrical foreman at Sarnia, Ont., appointed district electrician at North Bay, Ont.

Chesapeake & Ohio

H. C. WOODWORTH, general roundhouse foreman, appointed general foreman at Grand Rapids, Mich.

Chicago & North Western

MILTON H. CRANDALL, master mechanic at Huron, S.D., appointed diesel supervisor at Chicago.

Louisville & Nashville

EDMUND K. SHAFFER, JR., general foreman at Radnor, Tenn., appointed master mechanic.

Minneapolis & St. Louis

EARL E. GRABENBAUER appointed road foreman of engines.

New York, Chicago & St. Louis

C. C. COWDEN, assistant superintendent car department, appointed superintendent car department at Cleveland.

R. L. Lynn

Pennsylvania

P. D. HOLT, assistant shop foreman, Northwestern Region at Chicago, appointed supervisor diesel equipment, Northwestern Region.

O. F. OPATZ, supervisor diesel equipment, Northwestern Region at Chicago, retired.

Seaboard Air Line

Norfolk, Va.

R. L. LYNN, master mechanic at Savannah, Ga., appointed assistant chief mechanical officer.

W. M. HARRISON, JR., assistant shop superintendent at Portsmouth (Va.) car shops, appointed mechanical engineer.

Savannah, Ga.

L. B. ALEXANDER appointed master mechanic, Carolina and Alabama divisions.

H. R. BOYETT appointed diesel supervisor (system).

Obituary

E. L. COOK, mechanical engineer of the Seaboard Air Line at Norfolk, Va., died on August 8.

SUPPLY TRADE NOTES

RUST-OLEUM CORPORATION. — *C. C. Turner* has been named to the Railroad Sales Division at Omaha, Neb. Prior to joining Rust-Oleum Mr. Turner was with the Superheater Company and the Union Pacific as a supervisor on the diesel staff.

■

WORTHINGTON CORPORATION.—*J. R. Matullo* has been appointed branch manager of the sales office at Harrison, N.J.

The Plainfield Division of Worthington has appointed the *O. K. I. Welding Supply Company*, 1630 Walnut street, Cincinnati, and *Woodward, Wight & Co.*, 451 Howard avenue, New Orleans, as distributors for their line of welding positioners, turning rolls and fixturing equipment.

■

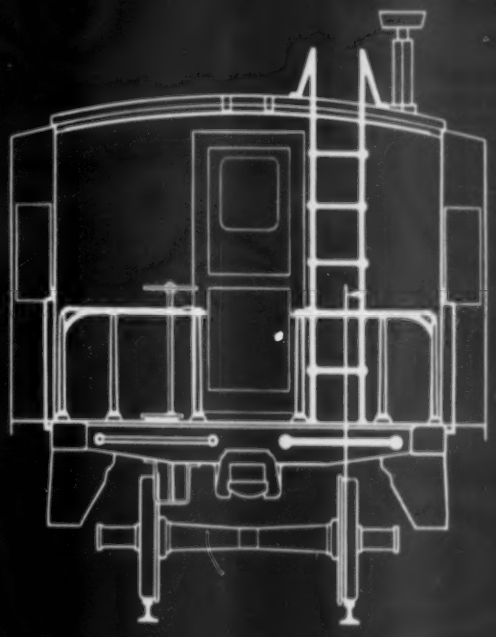
UNITED STATES RUBBER COMPANY. —Contracts have been awarded for the

(*Continued on page 24*)

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
June, 1952	2,672,513	8,466	14,495	22,961	116,394
June, 1953	2,926,001	8,537	15,296	23,833	122,771
1954					
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,472	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774

"G" CONTROL FOR CABOOSES



"G", the unit of change in velocity which is equal to the pull of gravity or 32.2 feet per second.

22 Leading Railroads shock-proof cabooses with Waugh or Duryea Cushion Underframes

Atchison, Topeka, and Santa Fe
Baltimore & Ohio
Bessemer & Lake Erie
Boston & Maine
Central of New Jersey
Chesapeake & Ohio
Chicago, Burlington & Quincy
Chicago & Eastern Illinois
Chicago, Milwaukee, St. Paul & Pacific
Denver & Rio Grande Western
Lehigh & Hudson River
Lehigh & New England
Lehigh Valley
Norfolk & Western
The Pennsylvania
Pittsburgh & Lake Erie
Patapsco & Back Rivers
Pittsburgh & West Virginia
St. Louis & San Francisco
The Reading Company
The Virginian
Western Maryland

*In service or on order

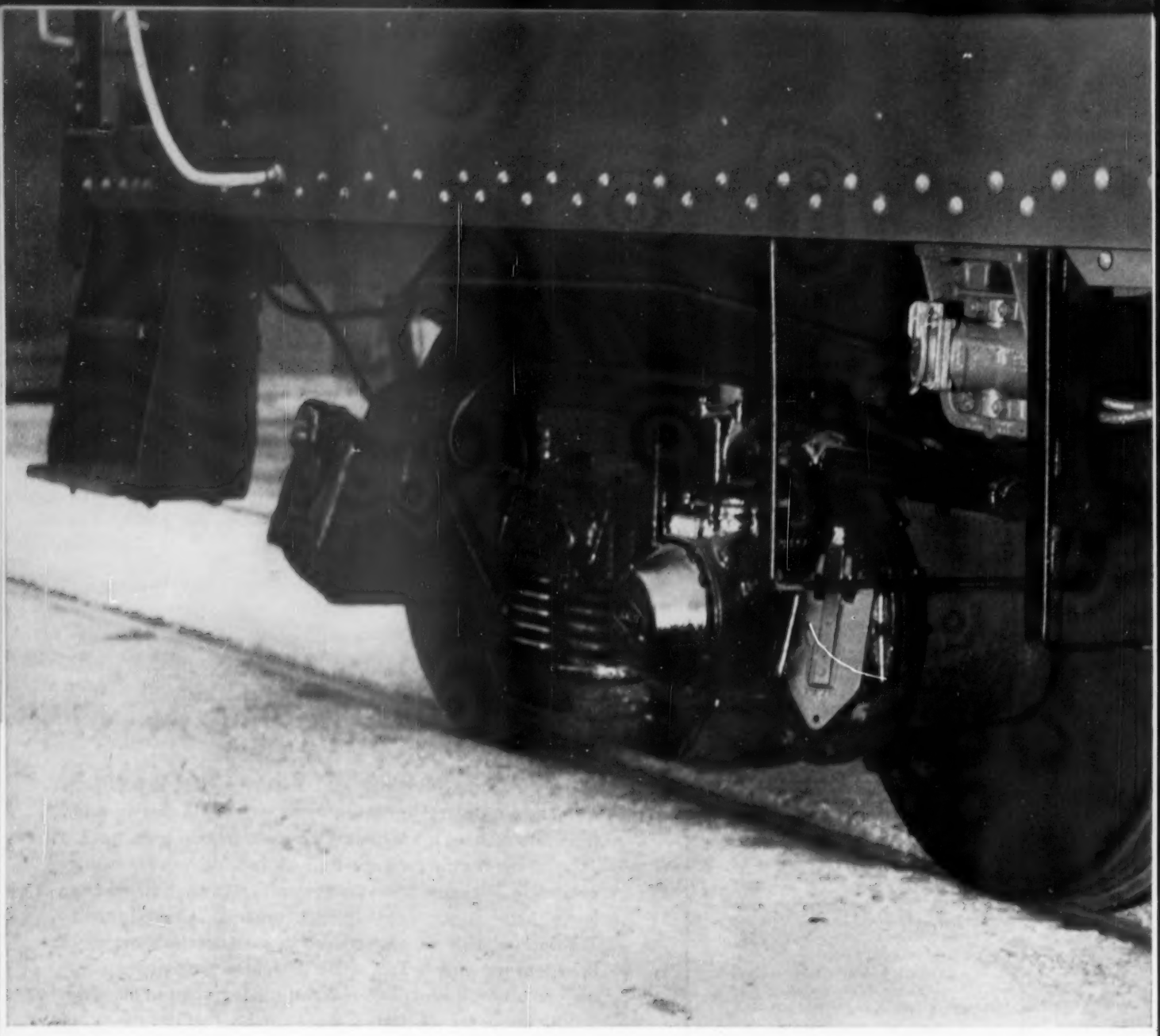
Always a rough riding car, the caboose, today, due to faster freight train operation is even more rugged. In putting a long train into motion, the locomotive accelerates up to as much as 10 mph before the caboose starts to roll. With every such acceleration or deceleration the caboose, subjected to the backlash of heavy car after car in pull-out or run-in, is jerked or jolted. The degree of shocks engendered by such accelerations makes it imperative that cabooses be given the maximum cushioning protection. Twenty-two railroads, with a total of more than 2,000 cabooses equipped, have found the answer . . . the Waugh Cushion Underframe.

The Waugh Cushion Underframe for cabooses is a unique car cushioning device of ample capacity. Under impact, the center sill slides longitudinally within the underframe. Impacts are cushioned by a snubber and long-travel springs within the sill supplemented by rubber Waughmats behind the couplers at each end of the sill. In consequence, the forces transmitted to car structure at all speeds of impact are only a fraction of that for cabooses equipped with conventional gears.

To fully appreciate this smoother riding and extra protection, ride a Waugh-equipped caboose in regular service. Arrangements for such personal observation can unquestionably be made with any of the railroads listed.

WAUGH Cushion Underframe

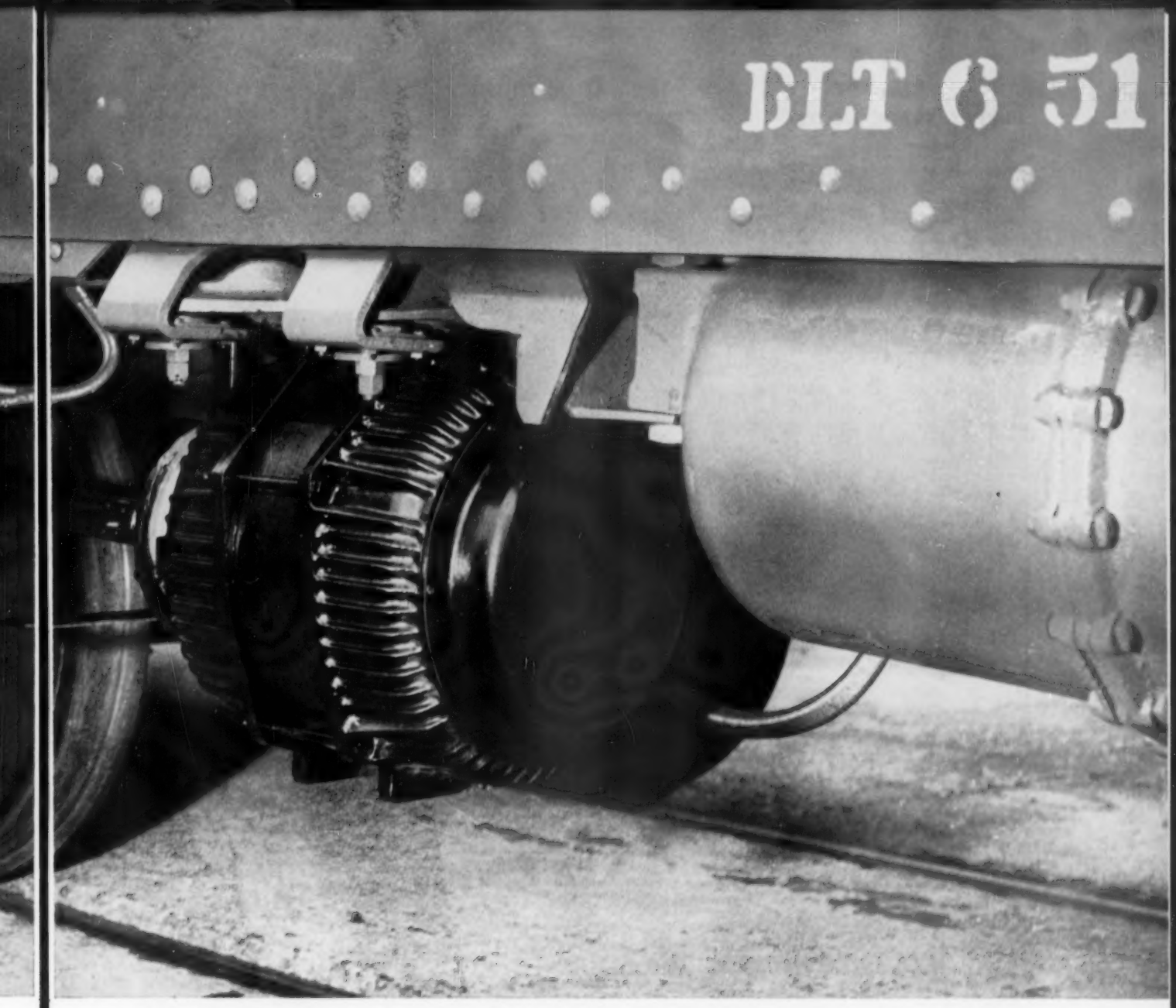
WAUGH EQUIPMENT COMPANY—NEW YORK · CHICAGO · ST. LOUIS · CANADIAN WAUGH EQUIPMENT COMPANY, MONTREAL



GENERAL ELECTRIC'S AXLE-DRIVEN PRODUCE ALL THE POWER

A wise, long term investment, the high capacity G-E Power Supply pictured above for cabin and head-end cars is a sure cure for generator obsolescence due to increasing electrical demands.

For more information, contact your G-E Apparatus Sales Office or write for Bulletin GEA-5865A. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 115-11



ALTERNATOR-RECTIFIER SYSTEMS YOUR CABIN CARS CAN USE

Progress Is Our Most Important Product

GENERAL ELECTRIC

SUPPLY TRADE NOTES

(Continued from page 20)

construction of a $235,000 sales branch and warehouse at Omaha, Neb., to replace present facilities. The building will be completed next spring.

■

TRANE COMPANY.—*William D. Graham, Jr.*, manager of the sales office in Greensboro, N.C., has been transferred to a special assignment at La Crosse, Wis. *E. A. Stroupe, Jr.*, succeeds Mr. Graham at Greensboro.

■

NICKEL CADMIUM BATTERY CORPORATION.—*Theodore Ulrich*, midwestern manager, has been appointed sales manager of the Sintered Plate Battery Division in Easthampton, Mass. *William R. Albrecht*, who was recently in engineering sales for the Electrical Products Division of the Minnesota Mining & Manufacturing Co., succeeds Mr. Ulrich at 122 South Michigan avenue, Chicago. *Melville E. Ingalls* has been appointed district manager of sales, covering eastern United States from 1475 Broadway, New York.

■

ARNEX CHEMICAL COMPANY.—*C. Raymond Ahrens, Inc.*, has been appointed distributor of Arnex, a liquid compound for blending with standard finishes for wood or composition surfaces.

A. K. McCord

WESTINGHOUSE AIR BRAKE COMPANY.—*A. King McCord* has been elected president and chief executive officer succeeding *E. O. Boshell* who remains as chairman.

■

FAIRBANKS, MORSE & CO.—*V. H. Peterson*, vice-president, railroad sales, has been transferred to vice-president-engineering, to replace *J. F. Weiffenbach*, resigned. *James G. Graham*, eastern regional manager, railroad sales, has been transferred to Chicago as general manager, railroad sales.

G. Q. Mathews

HUCK MANUFACTURING COMPANY.—*George Q. Mathews* has been appointed vice-president in charge of sales at Detroit. Mr. Mathews joined Huck in 1954 as sales manager. *Edward F. Walsh* has been appointed sales engineer in the lower New York, Long Island and western New Jersey territory.

■

DANA CORPORATION.—*H. S. Clarke* has been appointed sales manager, railway division. *J. A. Lindberg* continues as special railway representative.

■

STANDARD CAR TRUCK COMPANY.—*James H. Shaffer* of the Seaboard Railway Equipment, Butler, Pa., has been appointed sales representative and agent for Standard Car in the northeastern seaboard area.

■

BUDD COMPANY.—Budd has licensed the *Canadian Car & Foundry Co.* to build and sell Budd's all-stainless steel railroad passenger cars, disc brakes and the Budd Rolokron to Canadian railroads.

■

PEERLESS EQUIPMENT COMPANY.—*Charles F. Palmer*, president, has been elected chairman of the board and chief executive officer. *Norman T. Olsen*, vice-president, has been elected president, and *Lee P. Thomas*, sales representative, has become vice-president.

■

JOSEPH S. CRANE, vice-president and secretary of the Simmons-Boardman Publishing Corporation (publishers of Railway Locomotives and Cars), has resigned to set up his own business as a publisher's sales representative in the southeast, with office at Atlanta, Ga. Mr. Crane is retaining active connection with Simmons-Boardman and will be sales representative for this company's transportation papers in the southeast.

■

SUPERIOR CABLE CORPORATION.—*Don W. Hoffman* has been appointed industrial sales manager at Hickory, N.C. Mr. Hoffman was formerly a salesman for Westinghouse Electric Supply Company.

■

STRAN-STEEL CORPORATION. — The following appointments and changes have been made in the Stran-Steel Transporta-

(Continued on page 86)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE SEPTEMBER ISSUE

FREIGHT-CAR ORDERS

Road and builder	*No. of cars*	*Type of car*	*Cap., tons*	*Other detail*
AMERICAN REFRIG. TRANSIT CO.:				
Pacific Car & Foundry	300	Refrigerator	..	Estimated unit cost, $13,000. Delivery expected third quarter 1957.
BUTTE, ANACONDA & PACIFIC:				
Pullman-Standard	200	Flat bottom ore	70	Estimated cost, $2,000,000. Delivery expected second quarter 1957.
CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC:				
Pullman-Standard	100	Covered hopper	70	For delivery first quarter 1957.
DELAWARE & HUDSON:				
Greenville Steel Car	65	Covered hopper	70	Estimated unit price, $8,330. Delivery March 1957.
Pullman-Standard	10	Covered hopper	70	Estimated unit price, $8,250. Delivery December.
LAKE SUPERIOR & ISHPEMING:				
Bethlehem Steel	200	Ore	70	Cost, $1,600,000. Delivery scheduled for second quarter 1957.
LEHIGH & NEW ENGLAND:				
Greenville Steel car	200	Covered hopper	70	Deliveries of 400 cars expected
Pullman-Standard	100	Covered hopper	70	next April and May.
ACF Industries	100	Covered hopper	70	.....
RUTLAND:				
Pullman-Standard	25	Gondola	70	To cost $206,125. For June 1957 delivery.
	50	Box	50	Cost, $365,750. For July 1957 delivery.

PASSENGER-CAR ORDERS

Road and builder	*No. of cars*	*Type of car*	*Other detail*
BALTIMORE & OHIO:			
Budd	4	RDC-1	With reclining seats.
	2	RDC-2	To be equipped as tavern cars. Six cars in this order to be used as two three-car trains between Philadelphia and Pittsburgh.

INQUIRIES AND NOTES

LOCOMOTIVES:

Virginian.—Plans to purchase 12 3,300-hp. electric locomotives and 8 1,600-hp diesel units between now and early 1958.

FREIGHT CARS:

Alaska Railroad.—Has ordered 65 24-ft container vans, 40 non-refrigerated and 25 with temperature controls. Road has had nine test units in service between Seattle and Anchorage since last year.

Pacific Fruit Express.—Reported that 100 of total 2,000 refrigerator cars ordered from its own shops as reported in the February issue, are being equipped with Carrier Corporation refrigeration systems. Installation to be completed in January.

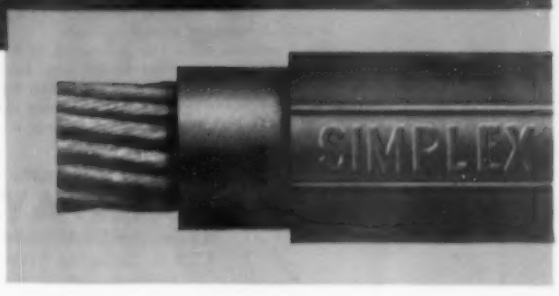
Virginian.—Plans to purchase 500 50-ton hoppers, 2,000 70-ton hoppers, 35 pulpwood cars, and 25 cabooses between now and early 1958.

Master of the Situation Entrusted to his safekeeping are many lives, and a fortune in freight and rolling stock. Little wonder, then, that the engineer is chosen with extreme care. The equipment he works with is hand-picked, too, and on the same basis . . . proven capability and dependability.

This explains why so many railroads make it a point to specify SIMPLEX SPECIAL DIESEL LOCOMOTIVE CABLES. Next time you order, make it SIMPLEX. **SIMPLEX WIRE & CABLE CO.,** Railroad Dept., 79 Sidney Street, Cambridge 39, Massachusetts.

LIVE BETTER ELECTRICALLY

Simplex



Now in use on more than 25 Class I roads

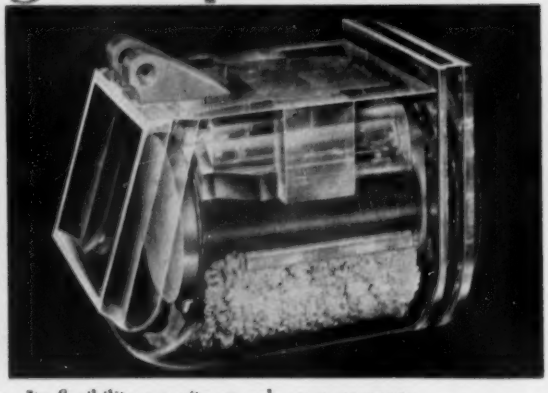
journapak®

THE MOST PRACTICAL TESTED LUBRICATOR

CONFORMS to the AXLE for GREATER COVERAGE!

In general interchange service on roads in all parts of the country, in all temperatures. This on-the-line testing, combined with 37 years of journal box lubrication experience brings you this *more efficient* lubricator.

TWO-WAY FLEXIBILITY MEANS *Security* WITH THE journapak®



The *Journapak* is a flexible, 3-section lubricator. Its flexibility permits an axle area coverage equivalent to that of waste. It is flexible in application too. In the photograph at left above, the *Journapak* is shown in use with a retainer; at right it is shown in box with cast integral ribs. Note that the *Journapak* extends around axle with complete coverage up to the waste retainer rib. This occurs on both sides of box simultaneously—which means *less* shifting, *more*, and *constant* coverage.

The *Journapak* is a 3-cushion, reversible, reclaimable lubricator constructed of heavy, tufted, non-glazing cotton chenille, wrapped completely around 3 separate neoprene fillers.

The 3 sections allow the *Journapak* to fit snugly to the bottom *and sides* of the box, *tailored to fit the axle*. The resilient neoprene filler maintains *constant* contact. Vertical axle movement creates a pumping action of the oil, delivering it to the base of the tufts for high capillary wicking action to the journal.

The *Journapak* is designed to eliminate glazing, waste grab and all unnecessary yard labor. It may be inserted in the box without tools . . . is quickly removed with a convenient hand strap.

The *Journapak* combines all the efficient advantages found in *all* other modern lubricators *without sacrificing full lubricating coverage.*

Security

Low original costs . . . write for details and prices.

RAILWAY PRODUCTS CO.

Exclusive Distributors

120 S. LaSalle Street, Chicago 3, Illinois

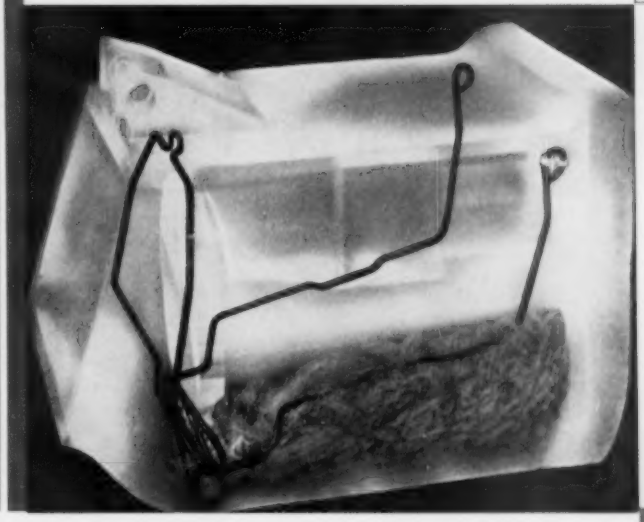
"37 years of railroading experience have built *Security* for you."

ADVANTAGES of the *Security*

PACKING RETAINER

with EVEN pressure DISTRIBUTION . . .

NO DANGEROUS CONCENTRATED PRESSURE POINTS!



FOR WASTE OR PAD LUBRICATION

METAL TAG ON LEG SHOWS RETAINER SIZE.

1. *No clips are employed.* This means that pressure is distributed *throughout the wire,* not concentrated at a single point.
2. Greater coverage of waste in the front lower section of box.
3. Downward pressure at the front of the retainer tends to make the rear legs swing outward toward the sides of the box, providing maximum safety with minimum chance for interference between the back leg and the journal or fillet.
4. Simplified installation and removal.
5. Designed for *maximum* holding pressure! Upward thrust of the lower front members keeps the retainer in a permanent position.
6. The front lower loop feature allows the packing to flex when the car is in motion, giving the packing more freedom to assist capillary attraction of the oil to the bearing. This flexible feature will also allow for a more lightly packed box than required with rigid retainers, thereby reducing the friction created by a tightly packed box and lowering the temperature set up by the contact of the packing and bearing as much as 50-degrees F.
7. The SECURITY RETAINER *is adaptable for use with waste or pad lubrication.* Design precludes shifting of waste or pad either sideways or forward.

NOW AVAILABLE:

A NEW MODEL WITH SHORTER LEGS FOR USE IN JOURNAL BOXES WITH CAST INTEGRAL RIBS.

Security

PACKING RETAINER CO.

120 South LaSalle St.
Chicago 8, Ill.

This sleek-lined, lightweight beauty hugs the rails. The "Keystone's" center of gravity is 45.1 inches instead of the standard 58. Weight saving, due to high strength nickel-containing stainless steel, tops 300,000 pounds for the seven-coach train.

Cars of the new P.R.R. "Keystone" are made of

Nickel-containing stainless steel ...weight saved, more than 30%

How can a car-builder – The Budd Co. in this case – install seats for eight additional passengers . . .
. . . hold car length to the A. A. R. standard 85 feet
. . . meet strength and safety requirements
. . . *and still cut down weight by 33,700 pounds per car?*

Credit the engineering skill that worked out the strong, basic tubular design.

Credit, too, the strong, corrosion-resisting metal used – nickel-containing Type 301 stainless steel.

Then consider two groups of facts about costs:

First cost savings – On the prototype train, these amount to $300 per seat. On full production basis it is estimated the per seat saving might reach $800. That's $459,000 for a train like the 7-coach Keystone.

Consider the weight savings – They are important. The total weight-reduction for the train tops 330,000 pounds. Even the trucks are lighter than standard.

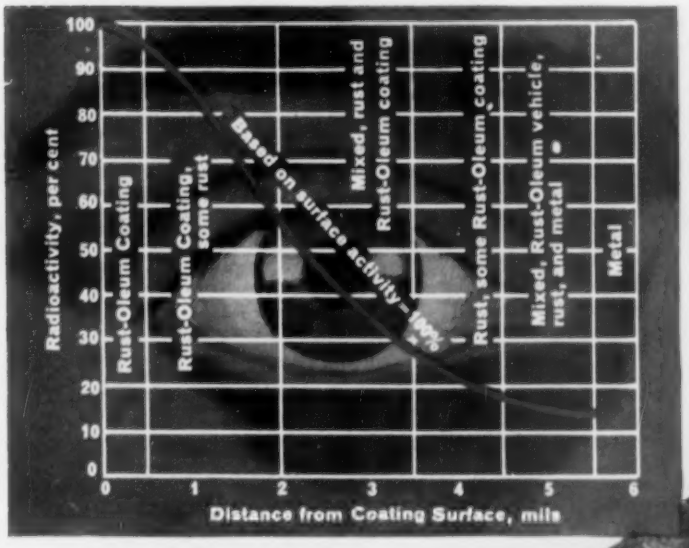
Upkeep and operating savings – These figures for the Keystone are, of course, not yet in. But when they're recorded they ought to make good reading.

For on many progressive roads that use *standard* cars built of nickel-containing stainless steel, the upkeep cost records are more than favorable.

"Nickel Alloys in R.R. Equipment" is the title of an idea-generating booklet that every railroad man might well read with profit. If you haven't received a copy, let us know and we'll send you one.

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

See Rust-Oleum *penetrate rust* to bare metal through the "Eyes" of Radioactivity!



Curved line illustrates Rust-Oleum penetration through rust at each mil level as recorded by Geiger Counter.

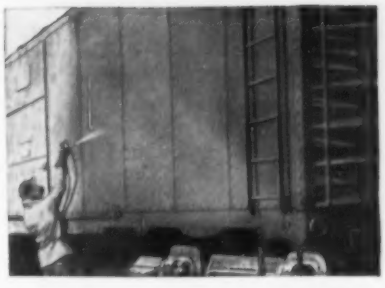
Rust-Oleum dries to a firm, decorative coating that resists salt water, sun, fumes, heat, humidity, and weathering.

Geiger Counter traces Rust-Oleum penetration to bare metal! In nearly three years of radioactive research, Rust-Oleum's *specially-processed* fish oil vehicle was radio-activated and formulated into Rust-Oleum 769 Damp-Proof Red Primer – then applied to rusted test panels. Rust-Oleum's specially-processed fish oil vehicle was then traced through the rust to bare metal by Geiger Counter.

This penetration means rust-stopping power, because the fish oil vehicle works its way into the tiny pits in the metal where it drives out air and moisture that cause rust. Important savings are yours, because Rust-Oleum can be applied directly over sound rusted surfaces – usually eliminating costly surface preparations. Attach coupon to your business letterhead for your copy of the thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.

There is only one Rust-Oleum. It is distinctive as your own fingerprint.

RUST-OLEUM®



STOPS RUST!

Rust-Oleum is available in practically all colors, including aluminum and white.

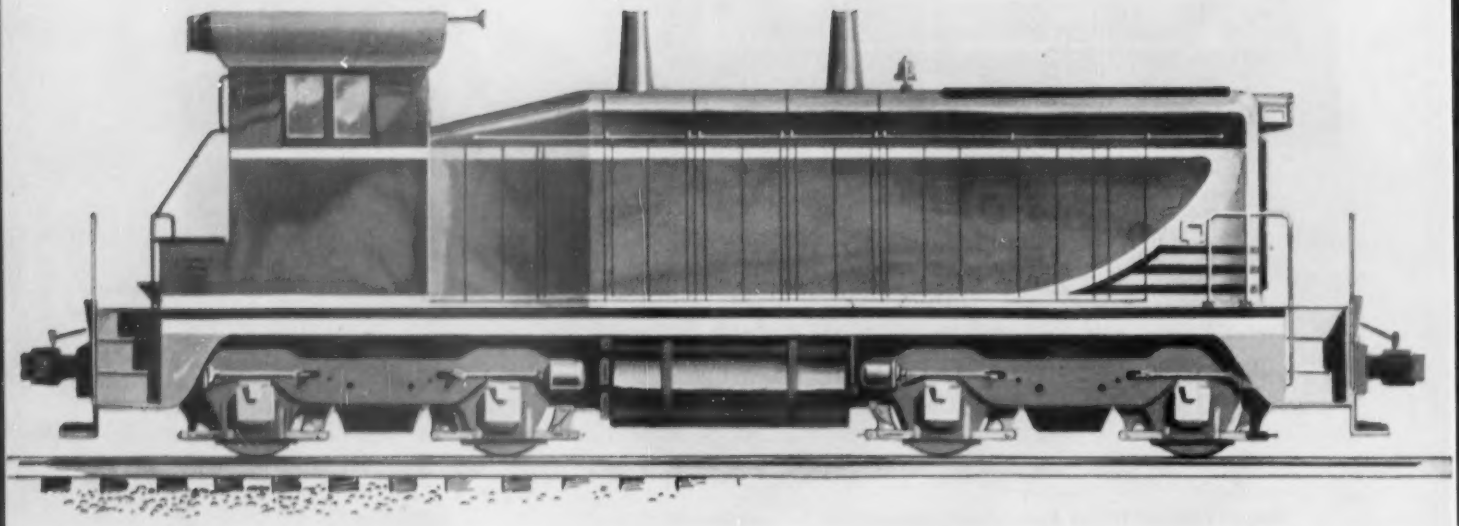
ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

Rust-Oleum Corporation
2590 Oakton Street
Evanston, Ill.

- ☐ Complete literature with color charts.
- ☐ Thirty-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

Electro-Motive's NEW FLEXIBLE

equips Switching



Twelve General Motors SW1200 switching locomotives with new flexible trucks have been delivered to the Illinois Terminal Railroad, and are now in service on the line's recently de-electrified route between St. Louis and Peoria. Twenty units are being delivered to the New York, New Haven & Hartford.

Electro-Motive's new flexible cast steel switcher truck* is similar to the one used on General Motors road locomotives. It employs the patented "Flexicoil Bolster Suspension" in which the truck bolster is resiliently supported from the truck frame by two sets of coil springs which provide both lateral and vertical travel.

This optional truck gives switching locomotives riding qualities comparable to F and GP units—makes them easier on track—capable of handling freight at reasonably good speed in branch or main-line service.

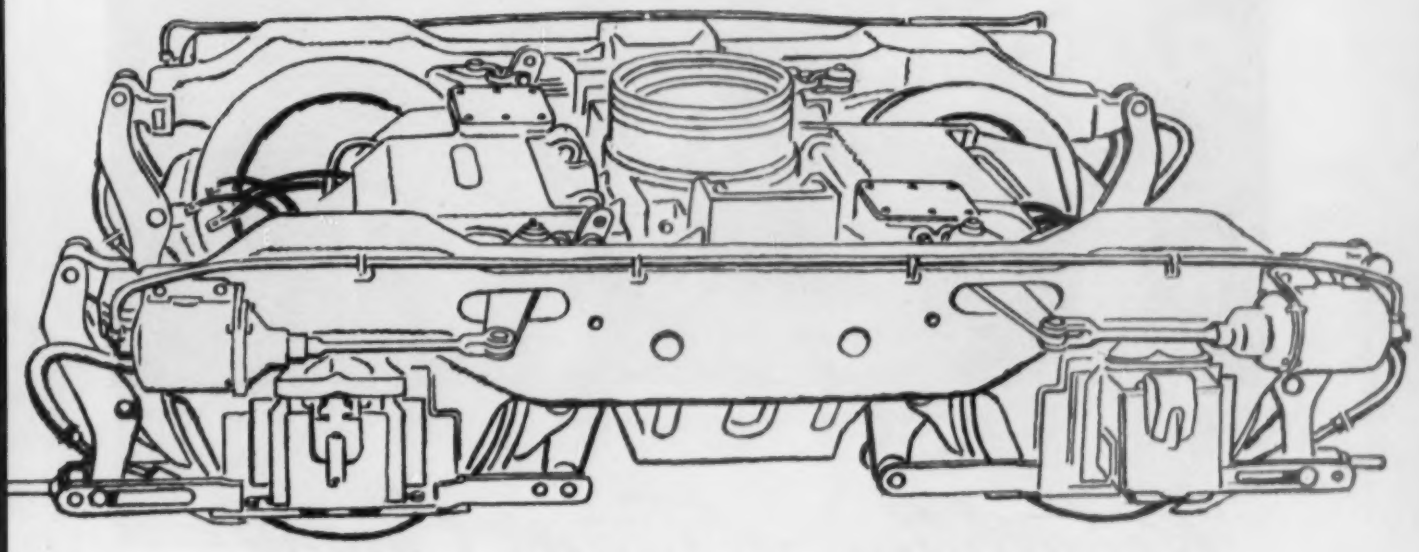
The frame is designed to use either the basic switcher plain bearing journal box or the power roller bearing journal box used on F, GP and SD type locomotives. The clasp brake arrangement is similar to that on our current F-GP truck.

Featuring interchangeability of parts with the 4-wheel Flexicoil truck, the new flexible cast steel truck is available as a replacement for the basic rigid truck on existing switchers with only minor modification of the locomotives.

For full details, write us or ask your nearest Electro-Motive representative.

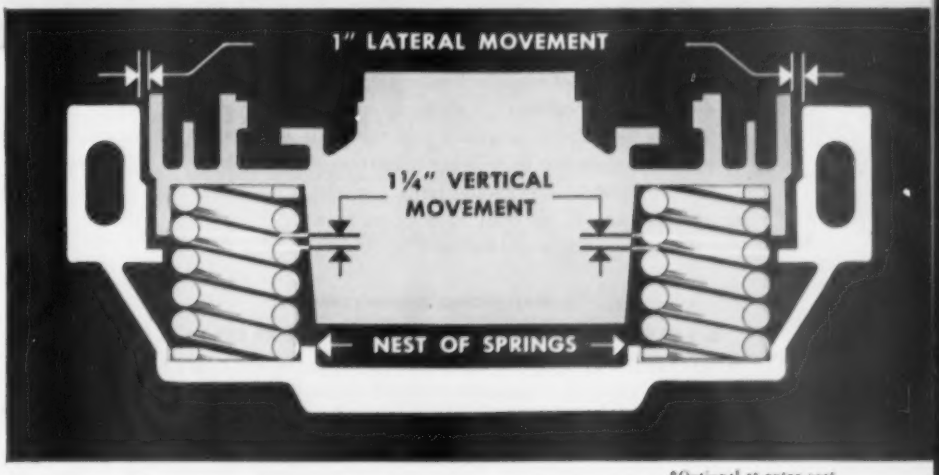
CAST STEEL TRUCK*

Locomotives for road duty



Electro-Motive's new flexible switcher truck employs coil spring suspension of the truck frame from the axle with the springs located directly over the journal box. This design eliminates the elliptic springs, coil springs and equalizer bars used in the truck frame suspension on the basic rigid trucks.

New flexible cast steel switcher truck features "Flexible Bolster Suspension" with large coil springs cushioning shock both laterally and vertically. This results in riding qualities comparable to F, GP and SD locomotives—makes switchers usable for main-line freight hauling at their maximum speed capacity. The new truck is applicable to existing switcher locomotives with only minor modifications.



*Optional at extra cost

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

La Grange, Illinois • Home of the Diesel Locomotive • In Canada: GENERAL MOTORS DIESEL, LIMITED, London, Ontario

Rebuilding piston crowns by sigma welding in a matter of minutes saves approximately 70% of new piston cost.

Rebuilding a Titan's Crown...

By Sigma Welding

Because it delivers increased horsepower faster and more efficiently than a steam boiler, the diesel engine has become a mighty and hard-working titan on the American right of way. But diesel economy and efficiency depend largely on maximum engine compression. Sigma welding is helping railroads maintain this vital compression efficiency by making it routine shop work to build up piston crowns and replace piston carriers—at savings up to 70 per cent of new part cost.

Sigma welding's combination of automatic wire feed and argon gas shielding is simplifying and speeding a wide range of jobs in shops across the nation. The sigma process joins all commercially fabricated metals, and attains speeds of more than 100 inches per minute in many operations. Both manual and automatic mechanized installations are easy to operate and maintain.

Learn how railroads are making greater savings than ever before with LINDE's modern methods for joining metals. Call your local LINDE representative today.

RAILROAD DEPARTMENT

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde" and "Oxweld" are trade-marks of Union Carbide.

Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .

Dearborn 2-Bed De-Ionizing Plant.

DEARBORN DE-IONIZING UNITS SUPPLY MINERAL-FREE WATER

This Dearborn De-Ionizing Plant produces 75,000 gallons of demineralized water daily. It reduces the mineral content in the water to the equivalent of that produced by distillation—at less cost. The unit is equipped with Saran-lined steel pipe, as well as rubber-lined tanks and valves.

Whether you require a manual, semi-automatic or fully automatic system, Dearborn gives you the properly designed unit to do the job.

When specifications call for mineral-free water, see Dearborn for a quotation.

The complete Dearborn line includes De-Ionizing Units, Zeolite Softeners, and Treatment Feeding Equipment to meet all requirements.

Dearborn®

SPECIALISTS IN WATER CONDITIONING AND CORROSION CONTROL SINCE 1887

USE THE COUPON FOR ADDITIONAL INFORMATION

Dearborn Chemical Company, Dept. RL
Merchandise Mart Plaza, Chicago 54, Ill.

Please send me information on Dearborn's

- ☐ De-Ionizing Units
- ☐ Zeolite Softeners
- ☐ Treatment Feeding Equipment

Name ..... *Title* .....

Company .....

Address .....

City ..... *Zone* ..... *State* .....

COBRA® SHOES

per passenger car

COBRA SHOES have now been tested in actual service of more than 18,500,000 car miles on seven railroads and three subway systems. Results have been outstanding in terms of longer brake shoe life, longer wheel life between turnings, lower costs and smoother, quieter rides.

Here are the figures from passenger train tests on an important railroad—

BRAKE SHOE SAVINGS—The Cobra shoes outlasted cast iron 5.3 times, which produced an average saving of $3.32 for each Cobra shoe used, or $53.12 per car per set of shoes. The indicated savings per car per year, using 160 Cobra shoes, were $531.20.

WHEEL SAVINGS—The *yardstick* of wheel life is the mileage between turnings. With Cobra shoes the wheels averaged 133,000 miles between turnings, but with cast iron shoes the average was 77,000 miles between turnings. The indicated savings per car per year in favor of Cobra shoes were $374.00.

TOTAL SAVINGS per car per year—$905.20.

It is obvious from this test that the Cobra shoe can produce a substantial saving in both brake shoe costs and wheel costs. If 150 cars were equipped with Cobra shoes, the savings would total well over $135,000 annually.

The return on the investment for the original installation of Cobra shoes averages between 50% and 100%. They pay for themselves quickly and then start earning handsome dividends.

MAKE THIS INEXPENSIVE TEST

Equip an entire train with Cobra shoes. Keep accurate records of brake shoe costs and wheel-turning costs. Compare them with your present costs. You'll find that Cobra shoes are one of the best possible investments you can make for quick return and continuing savings. Write for complete information.

The COBRA® SHOE

Product of the combined facilities of...

® *Registered U. S. Trademark*
Composition Brake Shoe

Westinghouse Air Brake Company

Specialists in Braking

RAILROAD FRICTION PRODUCTS

SAVE UP TO $900

per year

18,500,000 car miles of service have substantiated these outstanding facts:

FACT #1 Friction value is stable.

FACT #2 High friction value, permitting low shoe forces and simplified rigging, contributes importantly to lightweight train development.

FACT #3 Stopping distances meet existing standards—wet or dry—cold or hot. Substantiated in service tests by railroads.

FACT #4 With braking performance matched, wheel mileage between turnings is increased 50% to 100%. Shoe mileage is increased 400% to 500%.

RESULT! Savings up to $900 per passenger car per year!

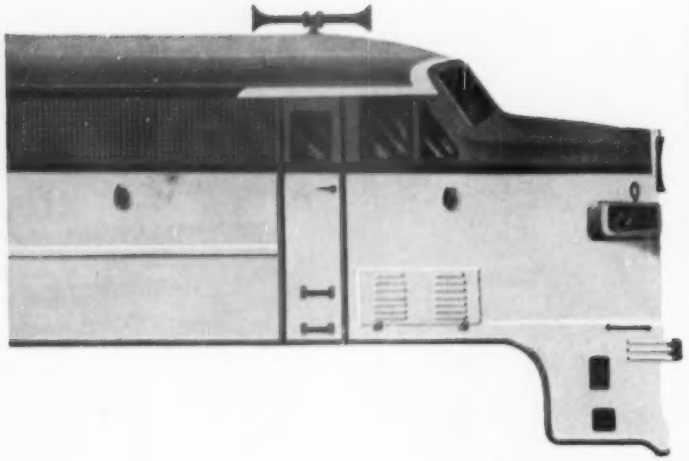
FOR RAILROAD CARS, LOCOMOTIVES AND SUBWAY CARS

Johns-Manville

Specialists in Friction Materials

CORPORATION, *Wilmerding, Pennsylvania*

Unbeatable diesel-cleaning team



Above the running gear—

PENNSALT PEN-GLEAM

PEN-GLEAM® can be used regularly on diesel locomotive exteriors to cut stubborn road film without damaging painted or metal surfaces. Applied either manually or with spray washers, in hot or cold water, PEN-GLEAM puts the gleam back on locomotive and car exteriors but *doesn't corrode while it cleans.*

For grimy running gear—

PENNSALT CLEANER "50"

PENNSALT® CLEANER "50" goes after the *really tough* soils picked up by trucks, underframes, wheels, and oil tanks. You get a higher percentage of cleaned running gear with Pennsalt "50" than with any other heavy-duty cleaner. Balanced alkalinity combined with penetrating wetting agents gives "50" a cleaning ability never before seen for toughest diesel maintenance.

ASK YOUR PENNSALT MAN about PEN-GLEAM and "50", or write Metal Processing Dept. 283, Pennsylvania Salt Manufacturing Co. East: Three Penn Center Plaza, Philadelphia 2, Pa.; West: 2020 Milvia St., Berkeley 4, California. In Canada: Pennsalt Chemicals of Canada, Hamilton, Ontario.

Pennsalt Chemicals

Why NATIONAL TRADE MARK *brushes are best for Freight Locomotives*

There are good reasons why more "National" brushes are used on diesel-electric freight locomotives than all other brands combined. Here's how they meet some of the grueling requirements imposed on brushes in this service:

1. Long life despite varied speeds and loading.
2. Excellent commutator film under all road-grade conditions.
3. Greater strength to absorb shock.
4. Better rideability for constant contact.

Not only in freight service, but in *all* types of diesel-electric locomotive service, "National" brushes deliver more for your brush dollar.

Specify NATIONAL TRADE MARK the brand of *earned* performance.

Best For All Types Of Equipment . . . Preferred For All Types Of Service.

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation
NATIONAL CARBON COMPANY • A Division of Union Carbide and Carbon Corporation • 30 East 42nd Street, New York 17, N. Y.
Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

INDEPENDENT LABORATORY TESTS PROVE—

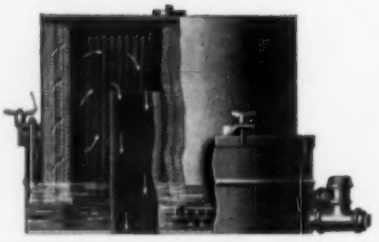
AIR-MAZE OIL BATH AIR FILTER STOPS 59% MORE FINE ARIZONA ROAD DUST THAN NEXT BEST FILTERING DEVICE!

Here's dramatic evidence of why power assembly life is greatly extended with Air-Maze oil bath air filters: An impartial testing laboratory compared the Air-Maze oil bath air filter with competitive filters. The results show that *the Air-Maze oil bath air filter removes 59% more fine Arizona road dust than the next best filtering device!*

The tests also showed that the Air-Maze oil bath air filter *maintains at least 95% efficiency even at the lowest locomotive engine speeds!* Proof positive that the Air-Maze oil bath filter doesn't depend on high air velocity to deliver top performance!

Because of facts like these, dozens of the leading railroads across the country are switching to Air-Maze oil bath air filters. They've found that this type of filter is a time tested and proven way of extending power assembly life, providing longer period without servicing, reducing downtime and cutting engine maintenance costs!

For further information on how Air-Maze oil bath filters can give *you* 59% greater filtering efficiency at less cost—call on us today! Air-Maze Corporation, 25000 Miles Rd., Cleveland 28, Ohio.



Typical Air-Maze oil bath filter that saves on engine wear and filter maintenance--pays for itself in less than a year.

The biggest names in diesels are protected by Air-Maze filters

ENGINE AIR FILTERS
CAR BODY FILTERS

AIR-MAZE

LUBE OIL FILTERS
PASSENGER CAR FILTERS

The Filter Engineers

Reproduce Factory Precision

with SIOUX

Dual Action Valve Seat Grinders

THE GREATEST possible accuracy can be obtained with the SIOUX Dual-Action Valve Seat Grinder and SIOUX Tapered Pilots. SIOUX Tapered Pilots are precision tools and offer the most positive guide known. The Dual-Action is a controlled fine vibration for grinding and dispersion of the cuttings with the grinding wheel mounted for full contact with the valve seat. It is a perfected system.

NEW SPLINE DRIVE IS MORE ACCURATE LASTS FROM 10 to 20 TIMES LONGER THAN OLD HEX DRIVE

HEAVY DUTY DRIVER

FACTORY APPROVED SETS FOR TRACTOR, TRUCK, RAILROAD, DIESEL

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DRESSING GRINDING WHEEL

SIOUX

USE SIOUX ALL THE WAY THROUGH . . .

STANDARD THE WORLD OVER . . .

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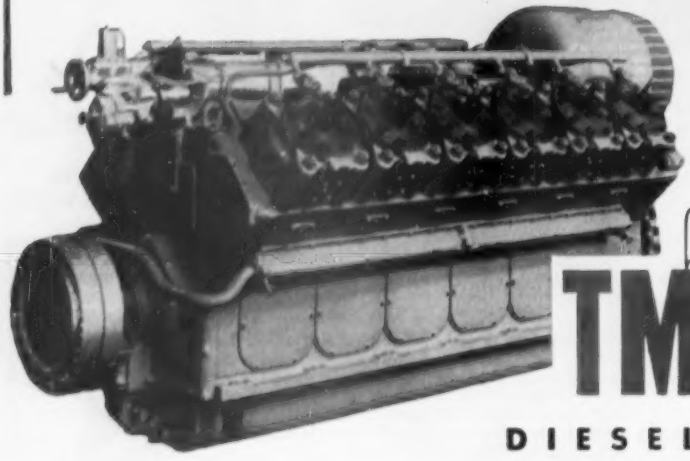
ELECTRIC IMPACT WRENCHES • GRINDERS • FLEXIBLE SHAFTS • POLISHERS • DRILLS
HAND SAWS • SANDERS • VALVE FACE GRINDING MACHINES • ABRASIVE DISCS

DEUTZ

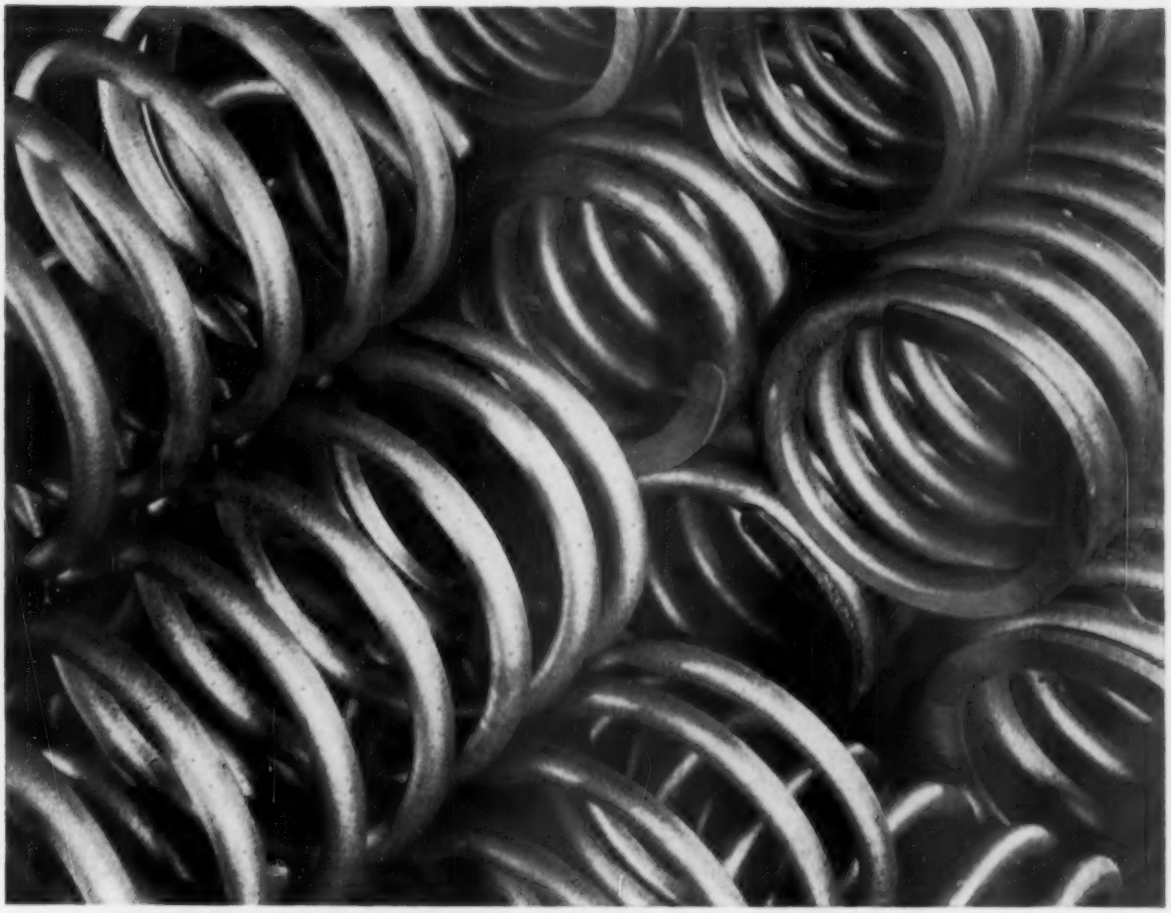


TM 625

DIESEL LOCOMOTIVES
powered by slow-speed 2-stroke DEUTZ diesel engines and equipped with hydraulic transmissions, for shunting and line service, with 4 to 12 cylinders, output ranging from 240 to 2000 HP

KLÖCKNER-HUMBOLDT-DEUTZ AG. KÖLN
(Germany)

Address inquiries from U. S. A., Alaska, Hawaii and Puerto Rico to: Diesel Energy Corporation, 143 Liberty Street, New York 6, N. Y.



Crucible fatigue-resistant springs

mean longer, better performance

Crucible *fatigue resistant* springs bring you a performance-bonus. They are made to last many times longer because they're shot peened.

Whether you specify single or double heat treated Crucible *fatigue resistant* springs, shot peening provides a better surface condition . . . and imposes a negative stress on the surface to offset positive stresses set up in service. It adds up to optimum performance – maximum spring life.

And Crucible, *the nation's leading producer of special purpose steels*, controls the manufacture of springs from ore to finished product. Inspections are continuous, and may include a final Magnaflux, if desired – all designed to bring you a better spring at low cost. For more details, write *Spring Division, Crucible Steel Company of America, McCandless Avenue, Pittsburgh 1, Pa.*

CRUCIBLE spring division

Crucible Steel Company of America

Spokane, Portland and Seattle Railway reports more efficient utilization of motive power with ALCO MODERNIZATIONS

The Spokane, Portland and Seattle Railway operates 34 ALCO road freight units on its tracks in the Pacific Northwest. Because of the heavy service performed by these units, SP&S has taken advantage of ALCO modernization kits and parts to upgrade this motive power.

SP&S applied the modernizations as a package—locomotive by locomotive—during regular scheduled locomotive overhauls.

Here's what they have to say:

> *"Modernization of our 34 ALCO road freight units, extending over a period of eighteen months, has just been completed. This modernization program has resulted in more efficient utilization of these 34 road units. This program has up-dated the diesel engine from a 1946 model to the 1956 model by taking advantage of engineering improvements over the past ten years."*

Modernize your motive power, too. Make it better performing, more efficient. You can do it right in your own shop with ALCO's modernization kits. For detailed information, contact your nearest ALCO Sales Office or write P. O. Box 1065, Schenectady 1, New York.

ALCO

ALCO PRODUCTS, INC.
NEW YORK
Sales Offices in Principal Cities

AVAILABLE MODERNIZATIONS AND MODIFICATIONS

Listed below are a few of the important ALCO modernizations which can mean increased efficiency in your ALCO 244 engines:

ALCO water-cooled turbocharger — more efficient, responds rapidly to changes in speed and load, easy to maintain.

Ni-Resist exhaust manifold—reduces casting growth and failures.

High-pressure fuel injection with snubber valve—more complete fuel combustion, lube-oil condition improved, line erosion reduced.

Ni-Resist insert pistons — top ring-groove wear reduced, increases ring mileage.

Grooveless and partially grooved engine bearings — oil film thickness and load-carrying capacity increased.

Hardened, chrome-plated crankshaft.

Serrated cylinder blocks — eliminates fretting at joint surface of saddle and cap, prevents distortion and misalignment.

Oil-bath filter — maintains high efficiency over 95 per cent, reduced filter maintenance, reduces engine wear.

Simplified amplidyne control system — fewer parts in system with simpler circuits, maintenance reduced.

Series lube-oil system — available in either flexible or rigid piping, provides simplified and improved oil filtration and cooling.

This machine for excavating intertrack ballast is only one of the many different types of track maintenance equipment lubricated with ESSO MULTI-PURPOSE GREASE.

One grease for many uses—
ESSO MULTI-PURPOSE GREASE simplifies maintenance

For all types of maintenance-of-way equipment . . . ESSO MULTI-PURPOSE GREASE. It is an ideal lubricant for such diverse equipment as ballast cleaners, tampers, cribbers, screeners and many other pieces of machinery, including automotive and construction equipment. The use of *one* grease instead of many is more efficient, more economical. Because of these benefits, more and more railroads have come to use and depend on ESSO MULTI-PURPOSE GREASE.

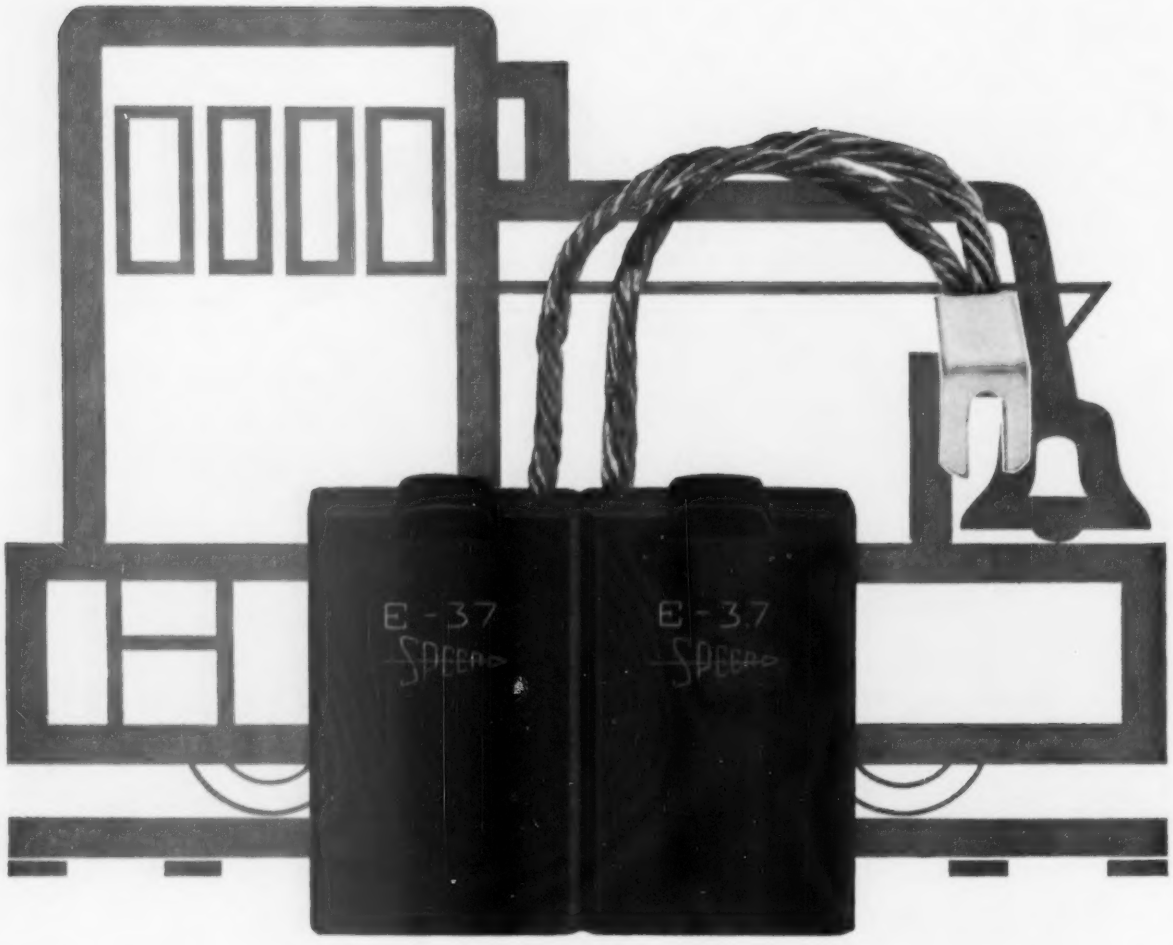
THREE IMPORTANT ADVANTAGES back the use of ESSO MULTI-PURPOSE GREASE:

1. Outstanding in quality, it has been proved on the road and in the lab in a multitude of applications. Meeting the rigid requirements for automotive wheel bearings, it performs equally well in applications requiring a general purpose grease.
2. ONE grease performs in many applications, eliminating the need for a variety of greases. It prevents the application of the wrong grease and possible damage to machinery.
3. Storage and handling problems are reduced to a minimum, resulting in greater economy. It is easier to protect a single container of ESSO MULTI-PURPOSE GREASE against contamination than several partially empty special-purpose drums.

Esso

RAILROAD PRODUCTS

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad Products.



Here's a brush that's built to take it!

It's the Speer E-37 paired brush, specifically manufactured for use in the traction motors of industrial-type diesel-electric locomotives.

These rugged engines put in a lifetime of grueling service; every day their brushes take a beating from shock and vibration. But the E-37 paired brush assures effective commutation and long, maintenance-free service under stress because its design includes such exclusive features as:

a neoprene pad inserted in the top of the brush to absorb shock and reduce vibration

a strong, vibration-proof shunt connection—made solid with Speer's own patented tamping compound

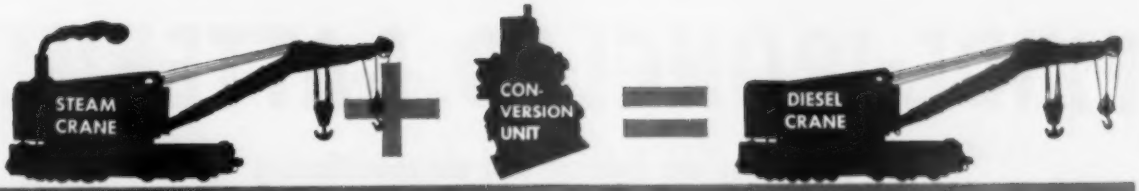
Whether you are maintaining an industrial motive unit or higher horsepower diesel-electric locomotives, there's a Speer brush made specifically for your equipment. And you'll find that Speer brushes consistently have a competitive edge because of their expert design and careful manufacture.

Speer brushes are designed for even wear, reduced vibration. That's why they give you improved commutation, longer service life . . . than ordinary brushes.

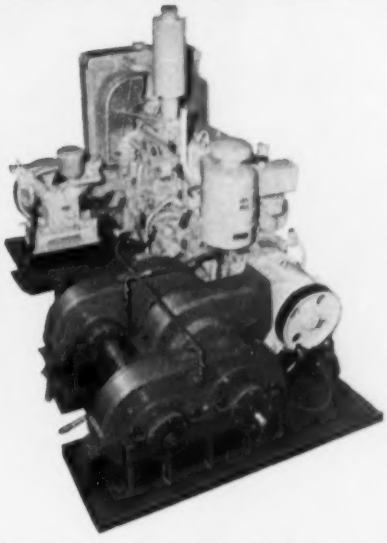
Write now for the new Speer Brush Catalog

SPEER Carbon Co.

St. Marys, Pa.



HOW SUBSTANTIAL SAVINGS IN LOCOMOTIVE CRANE FUEL COSTS ARE BEING MADE WITH THESE STEAM-TO-DIESEL CONVERSION UNITS



The economy of diesel engine operation is such that, with savings on both lower fuel and lower maintenance costs, the initial expenditure on a Brownhoist Diesel Conversion Unit is soon amortized. Brownhoist Conversion Units are engineered to the individual requirements of your crane. The component parts consist of the diesel engine, the torque converter, the roller bearing mounted friction clutches, and the air compressor . . . all mounted on a heavy one-piece slab base ready for installation. These units are completely assembled and tested before shipment to you, and the conversion bill-of-material becomes a permanent part of your crane record, to expedite future service. Write today or contact your Industrial Brownhoist representative (give crane serial number).

THIS 1925 150 TON WRECKER WAS STEAM, IS NOW DIESEL RESULT:

LOWER OPERATING COSTS

This Brownhoist 150 Ton Steam Wrecking Crane, built in 1925, was recently adapted to diesel with one of our conversion units. Its operators report a substantial savings in maintenance and fuel bills, more than justifying the cost of conversion.

BROWNHOIST

BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

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BAY CITY, MICHIGAN • DISTRICT OFFICES: Philadelphia, Washington, Cleveland, Chicago, San Francisco, Montreal
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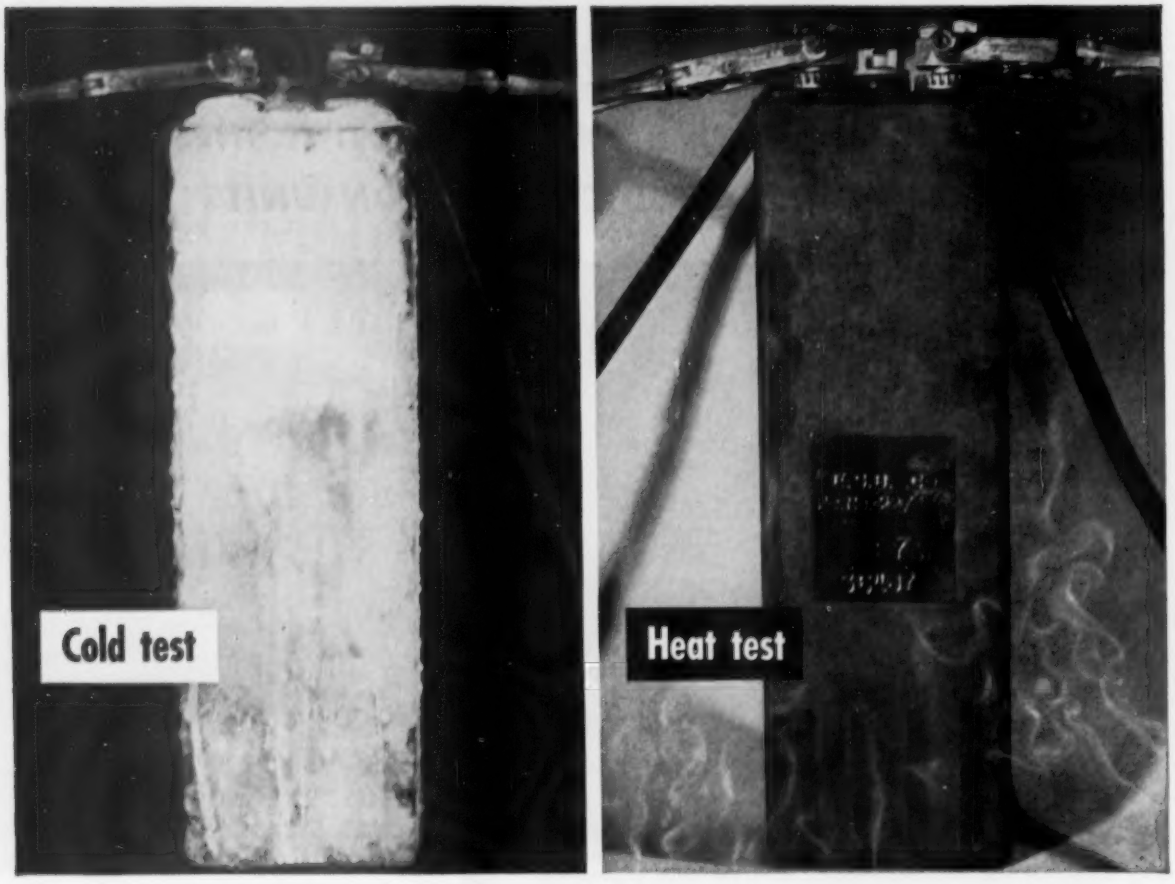
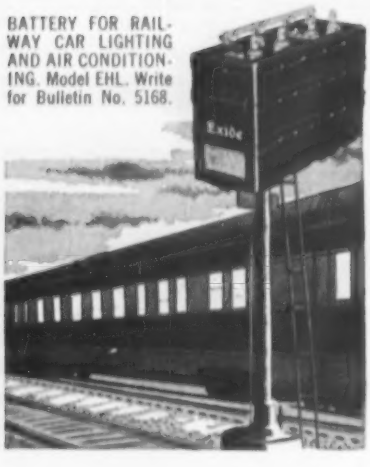
EXIDE-IRONCLAD BATTERIES

For railway car lighting and air conditioning



Deliver the power over a wide range of temperatures



BATTERY FOR RAILWAY CAR LIGHTING AND AIR CONDITIONING. Model EHL. Write for Bulletin No. 5168.

At few places on earth do storage batteries ever encounter such extremes of cold and heat as are used to test Exide-Ironclad Batteries in the laboratory.

These tests prove that Exide-Ironclad Batteries can be depended upon over a wider range of temperatures than they are ever likely to be asked to endure. And they provide tangible extra assurance of dependability at all the more normal operating temperatures.

Extreme temperature performance is especially important when a battery must have continuous dependability. It is often at these extremes that a battery is most needed. And a battery cannot be called dependable unless it can be counted on every day—all of the time.

The high and low temperature performance of Exide-Ironclad Batteries is a direct result of their unique construction features and special engineering. In countless applications, these batteries have earned an unmatched reputation for long life and high capacity. When you need batteries for heavy duty uses, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

Another GM contribution to railroad prosperity

why freight trains roll faster today than ever before...

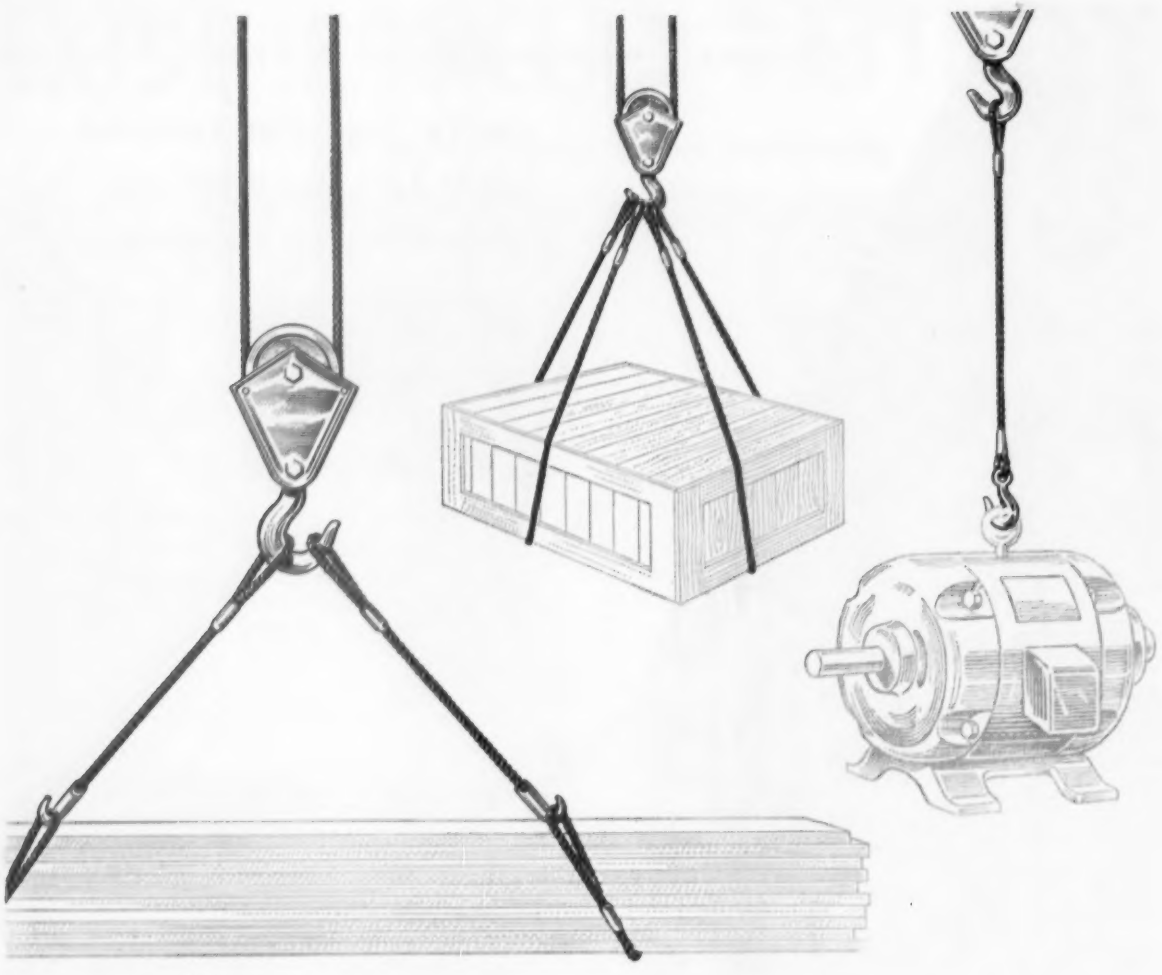
ONE REASON IS CTC (Centralized Traffic Control). With a finger-flick, the operator at the CTC panel board sets signals and switches to maneuver a fast freight past a slow one *a hundred miles away!* Now one track does the work of two . . . siding stops and waits are eliminated . . . trains can maintain faster schedules.

ANOTHER BIG REASON IS HYATT HY-ROLL bearings for non-stop freight. Their simplified, low-cost design has made it practical to equip more and more freight cars with roller bearings. With HYATT Hy-Rolls freight can roll on passenger schedules—unhampered by hot box, inspection and lubrication delays. Husky *straight cylindrical rollers* make HYATTS more dependable, easier to install and maintain. That's why the big switch is to HYATT Hy-Rolls—*the best bearings for the long haul!* Hyatt Bearings Division of General Motors, Harrison, N.J.

More Hyatt Roller Bearings are used by American railroads than any other make

Watch "Wide Wide World" Sundays on NBC-TV

HYATT *HY-ROLL*
bearings for non-stop freight



You'll handle most anything

QUICKER

with All-Purpose Slings

They're all-steel... kink- and crush-resistant... delivered ready for work. The tapered sleeve splices develop the full catalog strength of the rope itself. Write for folder, and order Roebling All-Purpose Slings for top speed and savings.

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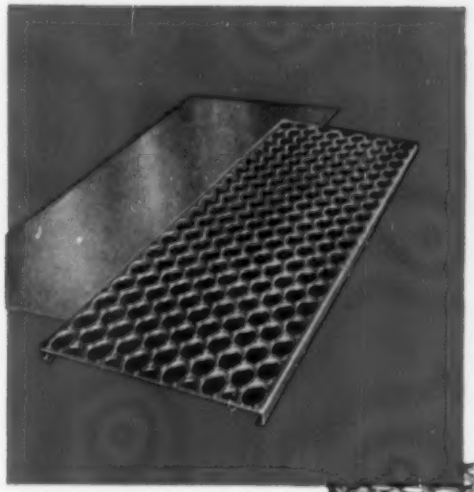
the Morton OPEN-GRIP

RUNNING BOARD AND BRAKE STEP



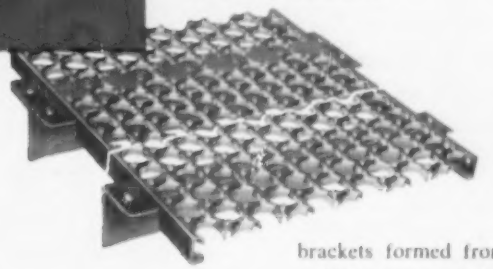
EXCLUSIVE ONE-PIECE CONSTRUCTION

Designed for ease of application, minimum maintenance and permanent sure footing.

"NO COST" MAINTENANCE — *One* piece of heavy gauge non-corrosive steel makes *one* piece of Open-Grip running board . . . no welds, joints or rivets . . . it *can't* break up. *GUARANTEED to last the lifetime of the car body!*

PERMANENT SAFETY — the perforated, raised Kass safety buttons with the self-cleaning "Open-Grip" design *always* provide a *positive* foothold under *any* weather conditions.

The unique design of the *adjustable* "cup-and-bolt" anchor eliminates precision work and greatly reduces application costs. A comparison of application costs between Morton Open-Grip and other running boards will tell the difference.



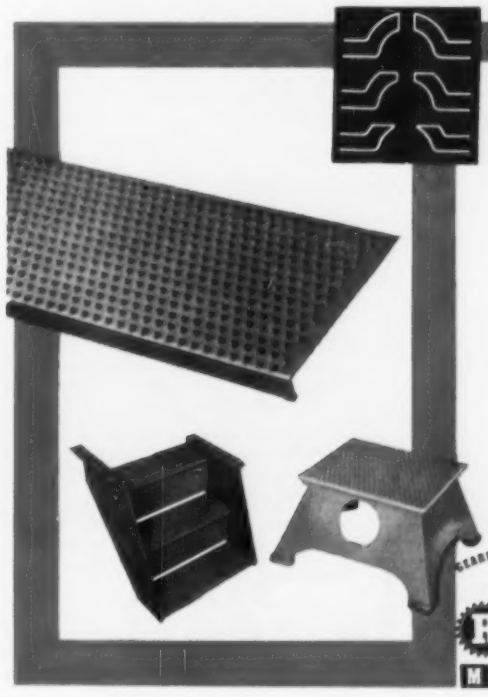
Self-cleaning—safe all year around. Hot dip galvanized after fabrication.

Strong—will withstand high distortional strain.

Versatile—used as: locomotive footboards, caboose platforms, step treads, catwalks, etc.

NEW RIVETED APPLICATION DESIGN

One piece construction continued! Application brackets formed from the board itself — no welds to come apart, or extra pieces for added weight.



KASS SAFETY TREADS

SELF SHARPENING BUTTONS. Stay safe as they wear - *lasting* anti-slip protection!

Famous Kass Safety Tread gives sure footing — positive foot-hold from all angles.

Versatility— fabricated of mild steel, stainless, aluminum or other alloys. Available in any size up to 36" x 120" and in thickness of 10, 12, 14 and 16 gauge. Flange arrangements as specified.

Economy–Morton Kass Treads are lower in cost, lighter in weight and wear longer. Simple installation — no maintenance problems.

GEARED TO PROGRESS R P I MEMBER

Morton MANUFACTURING COMPANY

5125 West Lake Street, Chicago 44, Illinois

GAIN THESE ADVANTAGES with MET-L-WOOD

METAL BONDED TO PLYWOOD

for new and rebuilt Passenger Car Interiors

FAST ASSEMBLY with Met-L-Wood, whether you fabricate in your shops or use prefabricated Met-L-Wood panels made to your exact specifications.

LIGHT WEIGHT Met-L-Wood panels can reduce weight to as low as 27% of the weight of comparable steel construction.

SOUND-DEADENING value of Met-L-Wood reduces outside noise levels, and is particularly valuable as sound-isolation when used for compartment partitions and doors.

VIBRATION DAMPING effect of Met-L-Wood helps prolong car life — gives passengers extra comfort.

and Smooth, Durable Beauty!

Whether plastic, painted steel, stainless steel, or aluminum, the smooth sweep of Met-L-Wood panels adds beauty to any car interior. Tough, abuse-resisting surfaces keep car interiors new-looking for years.

Details and technical data on Met-L-Wood panels, doors and partitions will be sent promptly on request.

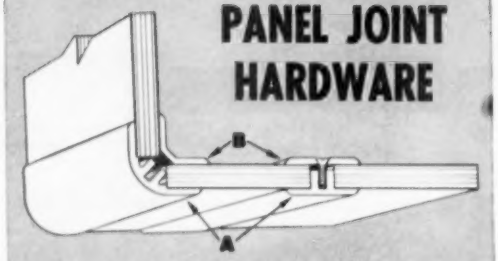
Write for Bulletins 520 and 521

MET-L-WOOD®

CORPORATION

6755 West 65th Street, Chicago 38, Illinois

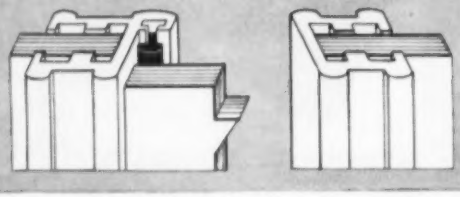
PANEL JOINT HARDWARE



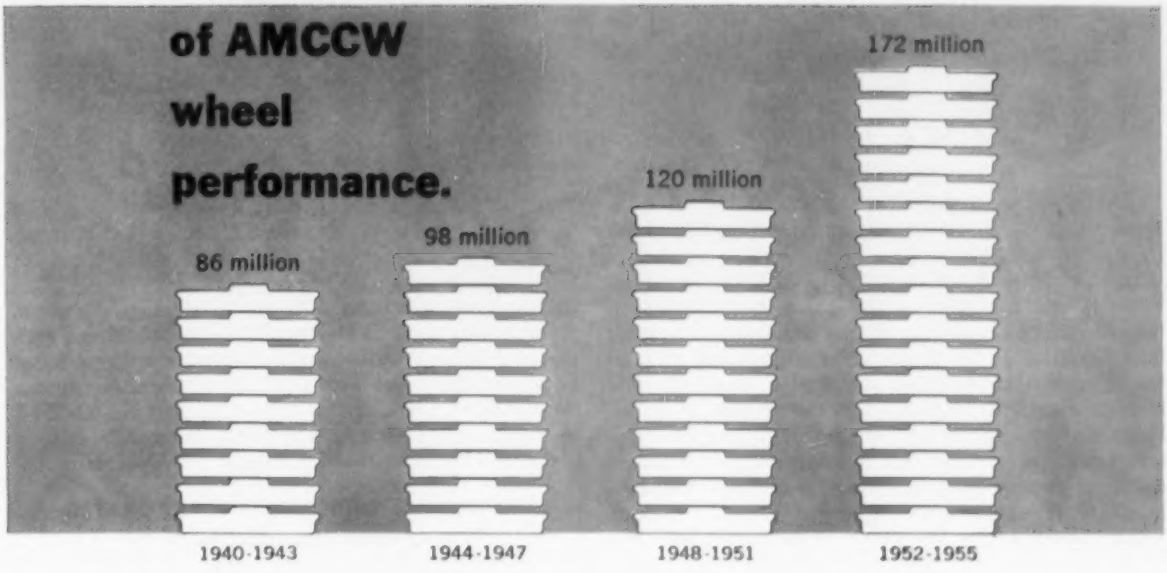
Met-L-Wood panels can be joined quickly and easily with these trim extruded aluminum units. Strips A have grooved slots which provide strong threads for standard 10-24 machine screws anywhere along the length. Strips B can be drilled for screws at convenient points along the panel joint.

PANEL EDGE FITTINGS

Extruded aluminum fittings for Met-L-Wood panel edges improve partition and door appearance and give permanent edge protection. Left below is the fitting for door stops. Keyed slot holds molded rubber bumper firmly and permanently. At right is edge fitting for sliding doors and partition edges. Both fittings are easy to install on Met-L-Wood panels.



ICC records tell the real story of AMCCW wheel performance.



each AMCCW wheel represents 10,000,000 car miles of safe operation!

The improved AMCCW chilled car wheel, adopted by the AAR in 1950, continues to show greater safety when measured by the cold, hard facts — ICC safety statistics for the entire United States over a standard period of time. In the graph this performance has been shown in four-year spans, each wheel representing 10,000,000 car-miles per AMCCW wheel failure.

The record shows how AMCCW wheels have improved under all types of freight cars. On 40- and 50-ton cars, the safety performance is still better.

The improved safety record of chilled car wheels is a matter of cold statistics.

low first cost
low exchange rates
reduced inventory
short-haul delivery
increased ton mileage
high safety standards
complete AMCCW inspection
easier shop handling

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

445 North Sacramento Boulevard, Chicago 12, Illinois

Albany Car Wheel Co. • Southern Wheel (American Brake Shoe Co.)
Griffin Wheel Co. • ACF Industries • Marshall Car Wheel & Foundry Co.
Pullman-Standard Car Mfg. Co. • Canada Iron Foundries, Ltd.
Canadian Car & Foundry Co., Ltd.

Did you know you can centerless grind car wheel axles?

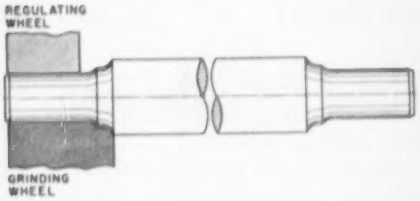
CINCINNATI

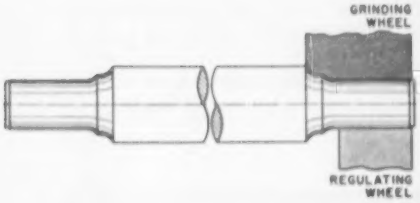
It's a big job to produce 90 half-ton car wheel axles per 8-hour shift. One railway equipment manufacturer does it by employing many of the latest automation techniques. Two CINCINNATI® FILMATIC No. 3 Centerless Grinders are included in the automated production line. The first machine grinds the anti-friction bearing diameter, dust collar diameter, and adjacent radii in one operation, at one end of the axle. The axle rolls over an elevated "highway" to the second machine, where the corresponding bearing diameters and adjacent radii are ground. ¶ Two interesting innovations are incorporated in this CINCINNATI centerless equipment: 1) A variable speed power driven outboard roller support serves as a helper drive to rotate the axle. Lateral movement of a cross slide on this support is synchronized with the infeed movement of the machine's regulating wheel slide. 2) A continuous caliper type gage insures size control during grinding, to an accuracy of less than half the allowable tolerance. ¶ CINCINNATI No. 3 Centerless Grinding Machines, with their exclusive FILMATIC bearing spindle mounting, are head and shoulders above any other precision grinder for handling work of this type. Catalog No. G-664-1 gives you a few reasons why. Write for a copy, or look in Sweet's Machine Tool Catalog for brief specifications.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

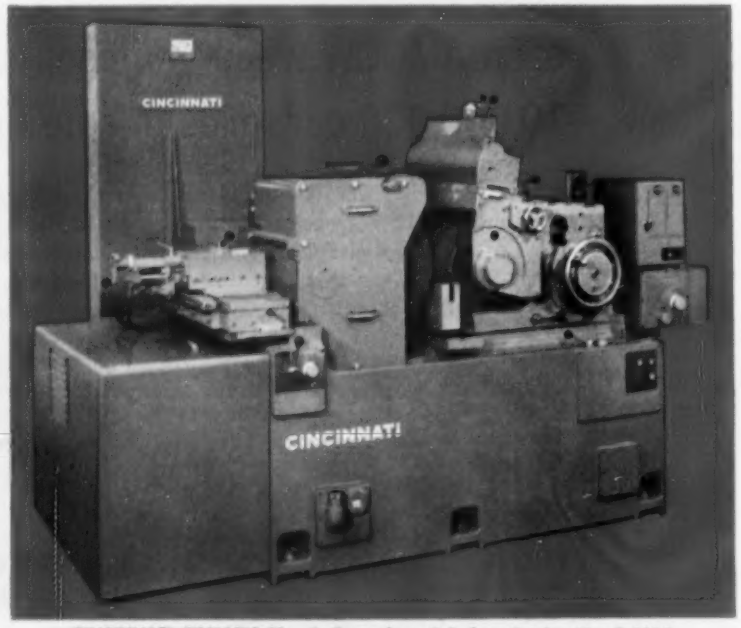
FILMATIC

MACHINE NO. 1





MACHINE NO. 2

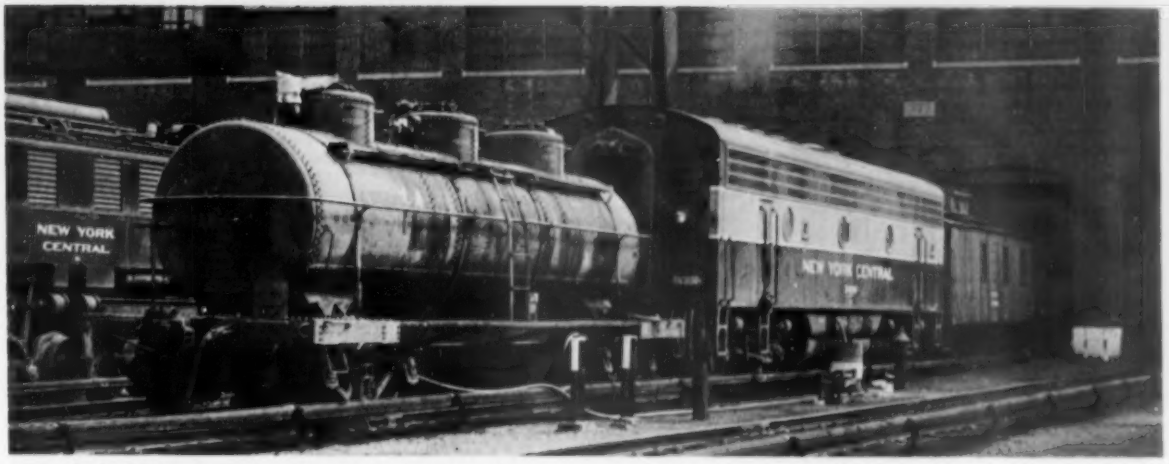


CINCINNATI FILMATIC No. 3 Centerless Grinder. Catalog No. G-664-1.

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE GRINDING MACHINES • CHUCKING GRINDERS MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES

RAILWAY LOCOMOTIVES AND CARS



TEST LOCOMOTIVE, 3-compartment tank car for test fuels, and caboose containing instruments and office.

Idle and Low Throttle Positions Are the Problem . . .

Lower Grade Does Require Dual Fuel System

NYC and Esso team up to determine the combustion characteristics of residual-distillate fuel blend and decide how it might be used.

By K. D. RELYEA
Assistant Engineer
Research & Developmeent
New York Central Railroad

and

N. H. RICKLES
Research Engineer
Esso Research & Engineering Co.

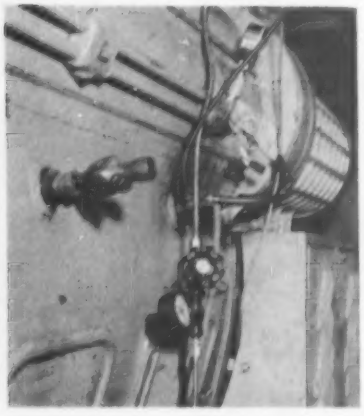
Fuel accounts for over half the operating expenses of a diesel road locomotive. Because of this, the railroad industry is keenly interested in lower cost fuels. It is essential, of course, that the performance of lower cost fuels should not result in prohibitive maintenance costs or other undesirable features of operation that may cancel out savings in direct fuel cost.

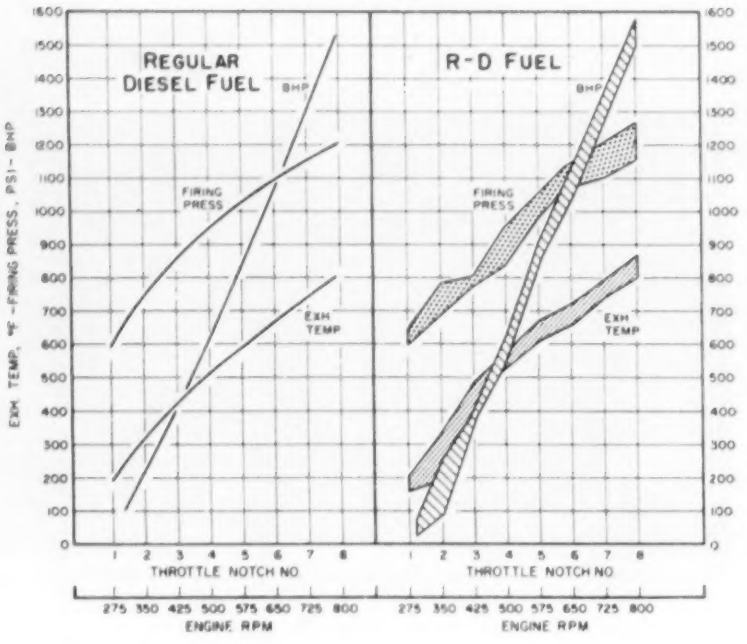
Practically all diesel locomotives today use an all-distillate type of fuel. Originally, a high grade distillate fuel was used, and it gave excellent results. In recent years, it was found economical to use lower cost, lower grades of distillate fuel. These still are well refined, good quality products of the type that are in high demand along the eastern seaboard for other commercial purposes. Therefore, the railroads are in direct competition for such products price-wise.

Because of this factor, the NYC made a survey of the availability of other types of low cost fuel in its operating territory. It was found that residual-distillate (hereafter referred to as R-D type fuel) blends offered the greatest potential saving. Considerable data on the use of this type of fuel in slow speed, high horsepower marine diesel engines were available. These data generally indicated that the use of R-D type fuels resulted in higher maintenance cost. However, because of the considerable price differential as compared to the all-distillate fuels, the overall cost saving was substantial. Corresponding data in locomotive diesel engines were unavailable.

Stationary locomotive tests by the New York Central indicate that a

ERRATIC OPERATION . . .





Engine instrumentation (above) included pressure pickup for oscillograph, thermocouple for measuring fuel temperature, gage measuring fuel pressure, and the Kiene cock for attaching firing pressure gage. Results (right) showed power output, firing pressure, exhaust temperature were constant with regular distillate, but variable with the R-D fuel.

residual-distillate type fuel of 300 SSU viscosity at 100 deg F gives satisfactory operation in an EMD 567-B engine when used in conjunction with a duel-fuel system. The dual-fuel system was found to be necessary because operation with residual-distillate type fuel in the lower throttle positions was unsatisfactory. Regular fuel is, therefore, required in these throttle positions.

A field test is now in progress on a freight locomotive equipped with a dual-fuel system. At the completion of this test it should be possible to evaluate such factors as maintenance and operating costs, fuel-handling problems, and lubricating oil degradation. The overall economy of using residual-distillate type fuel can then be ascertained.

A cooperative test program was set up between the NYC and Esso Research & Engineering Co. to determine whether true economy could be achieved with R-D type fuel in railroad diesels. The program was designed to determine whether the standard locomotive injection, pumping, and filtering equipment could handle these fuels satisfactorily and whether the fuels could be burned properly; to ascertain the effect on engine deposits, wear, and maintenance; to find out if engine operating regimens had to be changed; and to determine whether current lubricating oils would be satisfactory in conjunction with these fuels.

Properties of the R-D Fuel

Preliminary laboratory and locomotive screening tests were made on a number of R-D type fuels. The fuel selected for the work reported here was a blend of high-quality residual and distillate fuels having a viscosity of 300 SSU at 100 deg F. This viscosity was selected because it was felt that increasing the already large percentage of residual in the fuel would raise the viscosity to the point where storage and dispensing costs would counterbalance the reduction in fuel cost.

It was also felt that, if a higher viscosity fuel were used, handling problems on the engine might be excessive. The test fuel was prepared by blending a high-quality residual and distillate fuel which laboratory work indicated had good stability, good compatibility, and good filterability. It was felt that fuel of this quality had the best chance of giving satisfactory operation; if true, later work would be continued to determine the minimum quality that could be used economically.

Test Program

The test program was divided into three phases:

1. Determine the performance of the R-D fuel in a standard EMD 567-B engine in an F-7 freight locomotive in a stationary locomotive test.

2. If performance in the standard setup was unsatisfactory, determine if reasonable changes could be developed to handle the test fuel satisfactorily.

3. If either of the above resulted successfully, evaluate the test fuel in prolonged service on the road to learn effects on deposits, wear, lubricating oil deterioration, and general performance.

This report deals primarily with phases 1 and 2 of this program.

The stationary testing was conducted at the NYC shops at Harmon, N. Y. Instrumentation included a Brown electronic temperature indica-

tor, a Dumont double-beam oscillograph, indicating and recording voltmeters and ammeters, Kiene and Bacharach firing pressure gages, Bacharach spot and tape smoke meters, and Brodie volumetric fuel flow meters.

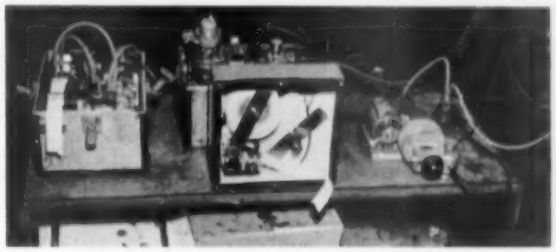
A total of 32 iron-constantan thermocouples and 15 pressure gages were used in the engine. Measurements included fuel temperatures at several pertinent points, water temperatures, lubricating-oil temperatures, all cylinder exhaust gas temperatures, and all exhaust manifold temperatures. Also measured were fuel pressure to and from each filter, and to and from the engine, and engine lubricating oil pressures. In addition, Kiene cocks were inserted in each cylinder for obtaining firing pressures.

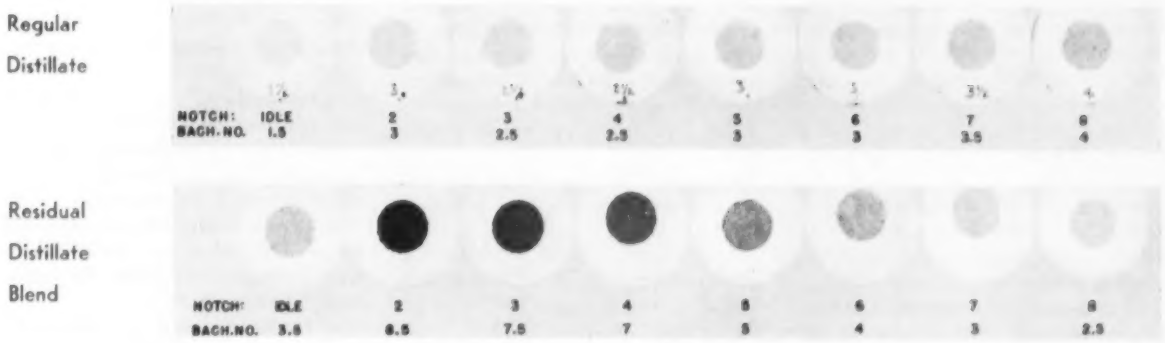
Before work on the test fuel was started, calibrating runs were made on the engine idle and at all throttle positions, using the regular distillate fuel employed by the NYC. The standard 11/32-in power piston setting was used. These tests included idling periods of 12 hours' duration. Work was then started on the test fuel without making any changes to the engine or supplying heat to the fuel.

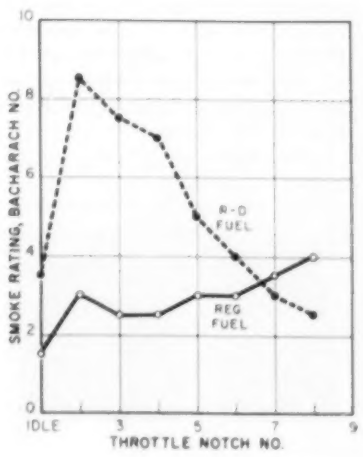
With the regular distillate fuel, measurements of power outputs, firing pressures, and exhaust gas temperatures consistently were reproduced and repeated from day to day. On the other hand, the R-D fuel showed considerable variations from day to day. Investigations revealed a heavy carbon build-up on the injector tips

RESIDUAL BLEND SMOKES IN LOW THROTTLE POSITIONS . . .

Bacharach Smoke Recorder Produced Results Shown Below ▶




Regular Distillate
NOTCH: IDLE 2 3 4 5 6 7 8
BACH. NO. 1.5 3 2.5 2.5 3 3 3.5 4
Residual Distillate Blend
NOTCH: IDLE 2 3 4 5 6 7 8
BACH. NO. 3.5 6.5 7.5 7 5 4 3 2.5



◀ Smoke Record

EXHAUST CONDITIONS AFTER ACCELERATION

R-D FUEL, STANDARD FUEL SYSTEM WITH HEATER—Fuel Temperature 220 deg F Slow Acceleration, 1 to 2 min per notch, following prolonged 2nd notch operation

Notch — *Observation*

2 Very heavy billowy dark smoke, oderous black carbon particles

3 Smoke same, exhaust manifold explosions accompanied by sheets of flame from tacks, "raining" carbon particles

4 Slight improvement in smoke, no explosions or fire

5 Same as 4

6 Starting to clear

7 Improving

8 Nearly normal

IDLING IS A PROBLEM WITH R-D FUEL

AFTER 12 HR IDLING AT 275 RPM

	R-D Fuel	Regular Fuel
Fuel consumption, gph	15.9	4.4
Fuel temperature to engine, deg F	96	88
Cylinder exhaust gas temperature, deg F (average)	244	187
Firing pressure, psi (average)	605	595
Smoke, Bacharach No.	10+*	1½

* Heavy layer of soot on tape

WITH R-D FUEL AT 55 DEG F

Fuel flow to engine, gph	16.5*
Suction pressure, in.Hg:	
From fuel tank	17.5
From suction filter	19.5
Pressure, psi:	
From fuel pump (relief valve open)	66
From Ful-Flo filter	30
From sintered bronze filter	9
From engine	1

* Regular fuel, 22.5 gph

which was felt to be the cause of this condition.

Low Throttle Operation

Excessive Exhaust Smoke.—It was noted almost immediately after starting that smoking was much heavier with the R-D fuel than with regular fuel up to the fifth throttle notch. Based on these procedures it was concluded that a smoke rating above 5½ would be unacceptable. In addition to the dark smoke developed in the lower throttle positions, large volumes of white smoke issued from the exhaust stacks, the amount decreasing as the throttle was opened through the fourth notch. White smoke was eliminated in the fifth notch and above. In other words, combustion through the fourth notch was not satisfactory.

Unsatisfactory Combustion.—During acceleration after an extended idling period, large waves of billowy white smoke tinged with yellow and accompanied by sparking were noted with the R-D fuel. A large volume of black carbon particles were also scattered around and on top of the locomotive during this acceleration. Prior to the acceleration, liquid fuel was found to be leaking from the exhaust manifold. Also, it was found that at the end of the idling period actual fuel consumption had increased from 4.4 to 15.9 gal per hr. This extra fuel flow was supplied by the governor in an effort to maintain the idling speed.

Operation in the No. 2 throttle notch position was found to be as unsatisfactory as at idle, even though the test fuel was heated in an effort to improve operation. Even after installing a new set of injectors, serious power losses occurred in a very short time in this throttle position.

It was found that power at the lower throttle notches can be regained by operating in the higher notches, but this is only temporary. In the following test the fuel temperature was raised to 220 deg F, the engine operated in the seventh notch for 1¾ hr, and then returned to the No. 2 notch. The brake horsepower dropped to 51 in 70 min and to 17 after 90 min. At this point smoking was very heavy and odorous. Observations were also made during a slow acceleration, 1 to 2 min per notch, at this time.

Injectors Fouled.—During the preceding tests, injectors were frequently removed for examination and on occasion replaced with new ones. In all cases the used injectors had fouled and carbonized tips. The interiors of the injectors, however, were in excellent condition. Test stand checks of the injectors after removing the carbon from the tips showed them to be satisfactory in all respects.

It was felt that this injector tip fouling was one of the major factors in the poor performance of the R-D type fuel. Other factors involved would be the poorer burning characteristics of the heavy ends of the R-D fuel at the lower temperature encountered at part throttle as well as actual combustion chamber design. A considerable amount of research by engine builders is now in progress on injector design in an attempt to overcome the fouling obtained with R-D type fuel. This is a project of considerable magnitude and it is not expected that a complete solution will be available in the immediate future.

Difficult Starting.—It was not possible to start the engine on R-D fuel at a "dead cold" temperature of 55 deg F. An immediate start was obtained with regular fuel. After the engine was warmed up on regular fuel, it could be operated on the test fuel. Data obtained on this point indicate that fuel flow to the engine was very low and pressure drops through the fuel system were very high.

Further test data indicated that the minimum starting temperature for the test fuel was in the range of 70 to 75 deg F. Even though the engine could be started at this temperature, fuel flow was insufficient to allow operation beyond No. 2 notch (as a result of pressure drops through the filters and fuel lines).

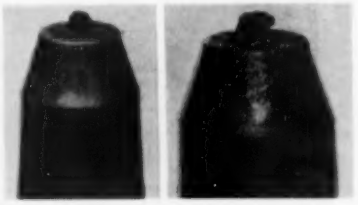
Conclusions.—Based on the results obtained up to this point with a standard EMD 567-B engine setup using R-D fuel, it was concluded that:

- Idling and low throttle notch operation are unsatisfactory.
- Engine starting and operation even at moderate temperatures, are unsatisfactory.
- Operation on R-D fuel above the fourth notch may be satisfactory.

Dual-Fuel System Necessary

After studying the above data, it was felt that the R-D fuel of the type tested might be successfully utilized with a dull-fuel system conforming to the following requirements:

- Retain essentially the standard locomotive fuel system for operation with distillate fuel through the fourth throttle notch.
- Install a second fuel system using two fuel pumps. One pump would circulate the R-D fuel from the locomotive tank through a heater and then back to the tank. It was felt that a minimum tank fuel temperature of 100 deg F was necessary. The second fuel pump would take the heated tank fuel, pass it through the desired filters



Injector fouling on test engine.

and heaters, and thence, at the fifth notch and above, supply it to the engine with a return to the fuel tank. Minimum temperature of the fuel to the engine would be 140 deg F.

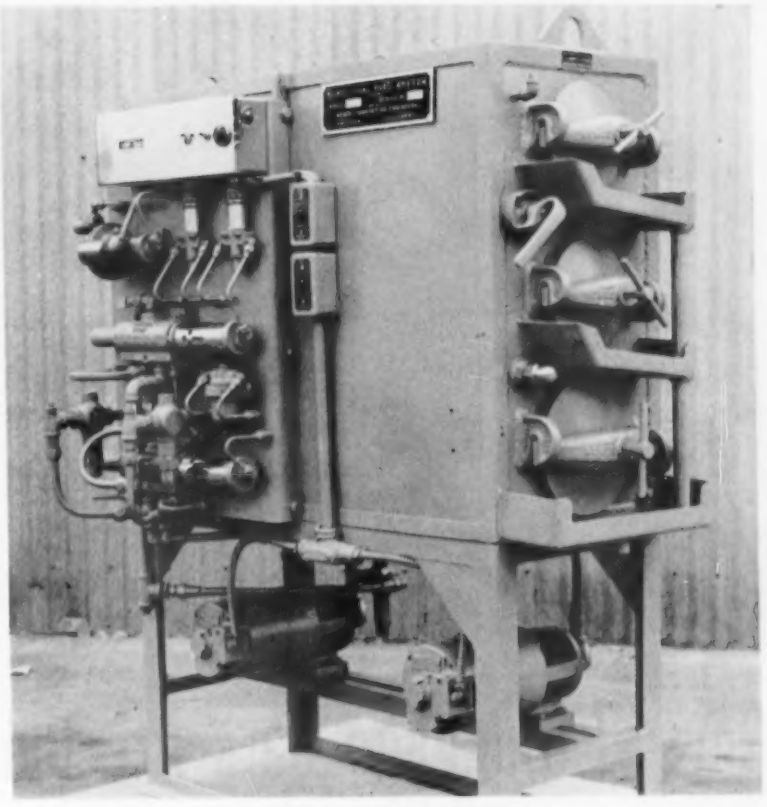
- Take all precautions to prevent contamination of regular fuel with the R-D fuel. This indicated a closed system for the regular fuel, with no return to the regular fuel tank.
- Take all precautions to prevent low throttle notch operation on the R-D fuel, such as might occur on a quick deceleration from No. 8 notch to idle.
- Design an automatic control system which would do all the above without attention from the train crew.

It was realized that use of a dual-fuel system would reduce the amount of the R-D fuel used and thus reduce fuel cost savings. In NYC freight operations, however, some 60 to 80% of the fuel gallonage is used in the fifth notch and above. This saving appeared attractive enough to investigate the dual-fuel system further.

A manually controlled dual fuel system was, therefore, set up and tested. Satisfactory results were obtained and it appeared entirely practical for railroad use. While nozzle tips using the dual-fuel system were not as clean as when using regular fuel, the extent of fouling did not appear to affect the engine.

At this time it was learned that a commercially manufactured dual-fuel system was available from the Nemec Corporation, which would meet most of the requirements indicated by the test work. The NYC purchased one of the early models of the Nemec equipment and installed it in the test locomotive. While a number of changes were made in this equipment to meet the requirements of the NYC operation, the basic design was found to be sound.

Some 6,000 gal of the R-D fuel was consumed in the stationary tests using the dual-fuel system. Consistent reproduction of such data as horsepower, exhaust gas temperature and firing pressure was obtained. In addition, added power was obtained with the R-D fuel, due to its higher volumetric heating value. Because of this additional power output, the power-piston setting was changed from the standard 11/32-in. position to the 3/8-in. position. This, of course, resulted in a lower fuel flow to the engine. With the reduced fuel flow at the 3/8-in. setting, the R-D fuel gave essentially the same power output as regular fuel at the higher flow of the 11/32-in. setting.



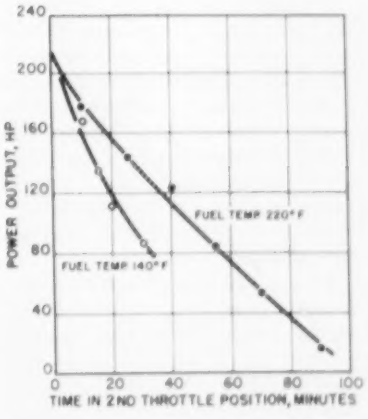
Nemec dual fuel unit has been designed for locomotive application.

Because of the encouraging results obtained in the stationary tests with the dual fuel system, the test engine was equipped with measured power assemblies and placed in regular freight service, using the residual-distillate fuel. This unit was coupled to an A unit, using regular distillate fuel, which was also equipped with measured power assemblies.

Road Tests

To date, limited miles have been accumulated on the locomotive without any trouble from the R-D fuel or the dual-fuel system. Regular lubricating oil is being used and periodic oil samples are being obtained for analyses both from the test and control engines to note if there are any differences. After at least six months' operation, both engines will be dismantled and checked for wear.

NYC and Esso Research people believe that, at the completion of the tests, such factors as the maintenance and operating and installation costs can be evaluated realistically to determine the overall economy of using R-D type fuel.



Power loss during prolonged low speed operation at No. 2 throttle with the R-D fuel. Following the test with the 140-F fuel which had seen output drop of 87-hp after 30 minutes, the engine was accelerated to No. 8 notch. It was run in this notch for 5 min and then returned to No. 2 notch. After 5 min output was 211 bhp.

Northern Pacific's 70-ft baggage cars have capacity of 30 tons and were built for main line service. The 8-ft door openings at near end have double metal doors. Opposite end has single doors over 6-ft openings. Cars are finished externally with DuPont synthetic enamel in NP's multiple-green door scheme, and insignia is Scotchlite reflective material.

How NP Baggage Cars Are Built

Pullman-Standard has delivered ten new baggage cars to the Northern Pacific, three with messenger facilities. The cars are built for long life and low maintenance in high-speed, long-distance service rather than with the aim of keeping initial cost to a minimum.

The car structure is Pullman-Standard welded girder type design meeting all RPO and AAR strength requirements. Structural members in the underframe, sides, ends, and roof, including the external sheets, are mostly of high-strength, low-alloy steel with a painted finish. The cars have a positive camber measuring $\frac{3}{16}$ in. at the center in the ready-to-run condition.

The underframe is of high-strength, low-alloy steel with all members welded together to form an integral unit from end to end. The center sill has two standard AAR Z-26 sections welded together to provide a total area of 18.4 sq. in. The center sill is butt welded behind each bolster to a separately constructed built-up draft sill weldment. The draft sills and center end sills are of built-up arc-welded construction. The inside side sills are continuous Yoder angle sections to which all cross-members and side posts are attached. They are reinforced at the baggage side doors.

The built-up, arc-welded, box-section bolsters are connected to the side sill by welding. This high-capacity bolster allows a maximum center plate load of 70,000 lb. The crossbearers are $\frac{1}{4}$-in. pressed channels welded to the center and side sills. Four are used per car between the bolsters. Two-piece center separators, comprising a plate and a pressed Zee, are used between center sill webs at each crossbearer. Additional separators (rolled channels) are installed between crossbearers and between crossbearers and bolsters. One such separator is used for spans of $8\frac{1}{2}$ ft or less, two for larger spans.

A car has eight jacking pads—four at the bolster locations and four more 3-ft. $9\frac{3}{4}$-in. from the end-sill line. The side sill is reinforced over each pad.

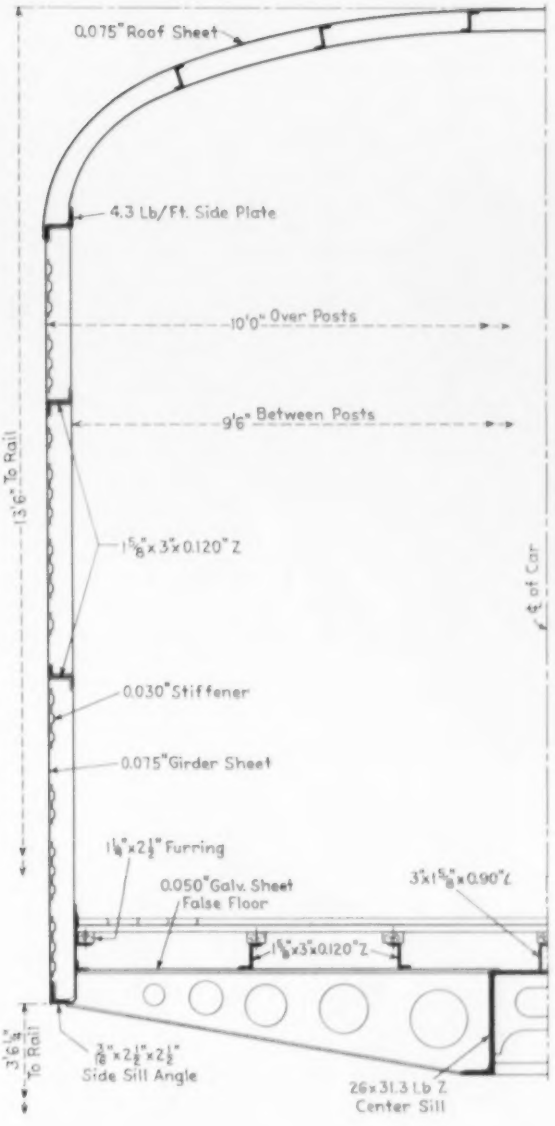
Welded Side Framing

Like the underframe, the side frame consists of high strength low-alloy steel. All vertical and horizontal members are arc welded together to form a continuous inner frame the full length of the car.

The outside side sill angles are also made in several pieces and butt welded together to form a continuous section. This is welded to the side posts and attached to the lower legs of the inside side sill of the underframe by lock bolts. One lock bolt is omitted in each bay between posts for drainage.

The side posts, belt rails, and side plates are also made in several pieces and butt welded together to form another continuous member the full length of the car.

The outside side sheets are spot welded to the framing members and the joints between the sheets are butt welded. The joint between the girder sheet and the outer side sill angle is sealed with a $\frac{1}{8}$-in. continuous arc weld fillet the full length of the car. Specifications call for the side sheets on the completed car not to exceed $\frac{1}{16}$-in. variation in flatness from post to post and between horizontal numbers. Between side posts the .075-in side sheathing is reinforced on the



Above: Door stanchions and ceiling brackets shown in builder's photograph were removed by NP after delivery. Continuous safety rods were suspended from the ceiling of the car on the center line. All cars also got fish racks at one end.
At left: Electrical control cabinet occupies floor space 20 in. x 22 in. Side lining is corrugated, galvanized sheet steel, and is applied to side structure with self-tapping screws.

PRINCIPAL DIMENSIONS OF THE NP BAGGAGE CARS

Length over pulling faces, ft-in	73-10
Length between truck centers, ft-in	48-4
Width over side posts, ft-in	10-0
Width between side posts, ft-in	9-6
Height, rail to top of roof carlines, ft-in	13-6
Height, rail to top of floor, ft-in	4-4½
Height, rail to center line of coupler, ft-in	2-10⅛
Inside length (inside of end finish), ft-in	70-11⅞
Load capacity, lb	60,000

inside with horizontal, corrugated stiffeners spot-welded in place.

The end framing is of the same material as the side framing. The roof is entirely of welded construction except that the roof sheets are attached to the side frame in the final assembly with special lock bolts. Material is high-strength low-alloy steel. Carlines are on 3-ft centers, purlines on 18-in. centers, and the bottom flanges of the purlines are welded to the bottom flanges of the carlines.

In addition to Gustin-Bacon 1-lb, long-fibre, thermal insulation, 1/16-in. asphalt and cork insulating adhesive tape is applied between metals where the interior finish joins to the framing members. Adhesive fabric type tape is used between inside finish members as a sound-deadening material to prevent squeaking of the interior finish.

Joints and concealed surfaces of framing members, including the underside of the roof and the top of the sub-floor area, are treated for corrosion resistance by applying a 1/16-in. thick rubber base coating at all locations but side-sill pockets where the coating is 1/8-in.

Buffers are installed on each end to keep the face plate extended to maintain contact with the face plate of an adjacent car when coupled in a train. Two compression spring type buffers are located in the lower portion of the face plate. One five-leaf, semi-elliptical spring type buffer with sliding shoes is in the upper portion of the face plate. In the coupled position each of the lower buffer springs exerts a force of about 1,500 lb. There are Morton diaphragms. Waugh rubber draft gears for 24⅝-in. gear pocket are used with Buckeye tight-lock couplers, and short type coupler yokes.

Water and Heating Systems

Water supply and plumbing facilities are provided only on the three cars with messenger facilities. One 40-gal overhead cold-water tank insulated against condensation with a 3/16-in. coat of sound-deadening cement supplies all water. A Vapor heating jacket adjacent to the wash

stand supplies hot wash water. The drinking-water cooler is a Mink-Dayton ice-type. Washroom fixtures are Crane type.

The cars are heated by a manually controlled low-pressure steam system with two Vapor overhead-type heaters and floor heat. The main steam train line is 2⅞-in. outside diameter annealed seamless-steel tubing. Branch lines carrying train line pressure steam to regulators are of extra strong black steel pipe.

Two courses of flooring are applied with a 14-lb tarred paper between them. Both are $^{25}/_{32}$-in. The lower course is $5^{3}/_{16}$-in. width No. 1 common tongue-and-groove yellow pine. It is laid crosswise except at the side door opening where it is laid diagonally. It is toe nailed to the wood frame and coated with freight-car mineral paint before application. The upper course is 3¼-in. wide grade B Douglas Fir with a maximum moisture content of 10 per cent. It is applied lengthwise except at the side doors where it is laid crosswise. Galvanized sealed flashing is used at the side and end of compartments and extends 4 in. above the floor and underneath the inside finish sheets.

64-Volt Electrical System

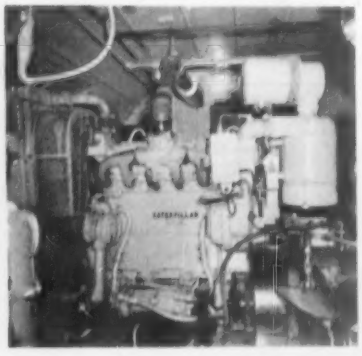
The car electrical system is a nominal 64-volts d.c. supplied from a 4-kw, V-belt-driven body-mounted Safety generator complete with reverse current relay and a 76-volt regulator.

Capacity of the Gould 32-cell lead-acid battery is 300 amp-hr at the 8-hr rate. There is one 150-amp, 125-volt battery charging receptacle on each side of the cars. All lighting is from incandescent lamps with current furnished through a 22-amp Safety lamp regulator set at 61 volts.

Conduit underneath the car is standard weight galvanized steel with threaded connections. Other conduit is thin-wall steel. Train line conduit also has been provided for possible future conversion to electric braking.

HSC brake equipment with D-22-BR control valve is applied and also has provision for future change to electro-pneumatic operation. Air-brake piping is Byers wrought iron throughout. The main brake pipe is 1¼-in., threaded, extra-strong. The branch pipes are 1-in., extra strong with a length limit of 3 ft. A Peacock lever-handle hand brake is used for braking on one truck of the car.

The cars and the trucks are designed to negotiate a 23-deg curve (251-ft radius). Wheels are Standard Steel 36-in. diameter multiple-wear type with taper tread. The trucks have Budd disc brakes, and Rolokron wheel slide control. While not installed at this time, provision is made for future application of vertical type friction shock absorbers. These four-wheel General Steel Castings trucks have outside swing hangers and are completely equipped with Alco coil springs. The 24-in. central bearing has horizontal and vertical Thermoid liners. The 6 x 11-in. journals are equipped with Timken roller bearings.



Conversion packages using Caterpillar engines (above) have been installed in B&M wreckers (right) and in locomotive cranes.

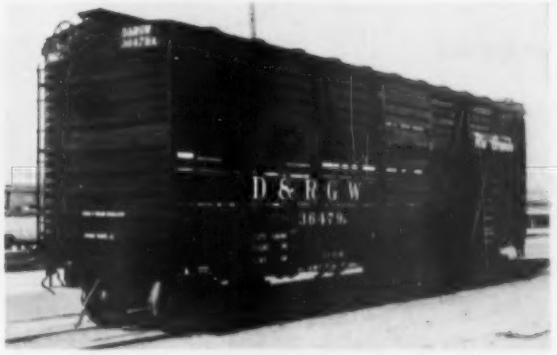
B&M Wreckers Go Diesel Too

The Boston & Maine recently converted a 250-ton wrecking crane to diesel power. The railroad was aided by the Perkins-Milton Company in the work on the 250-ton crane and a second conversion unit is now on order. They have also rebuilt nine 15-ton ex-steam locomotive cranes, using Caterpillar diesel conversion power packages. The 250-ton cranes use Industrial Brownhoist conversion packages. In these, the power plants are Caterpillar D337 diesel engines, developing 219 hp. at 1,800 rpm. The engine has a Twin Disc torque converter with a wide chain housing. Torque converters combine the advantages of the diesel with the torque characteristics inherent in steam power.

A result of dieselization has been the elimination of many facilities necessary for steam-operated equipment. Coal, water, maintenance facilities and personnel are no longer readily available in some areas. Conversions not only eliminate these difficulties, but also produce lower maintenance and operating costs, high availability and lower overall height. Dieselization of former steam powered cranes fits in with the overall railroad diesel program.

How Rio Grande Cut Stock Car Cost

Despite higher material costs, the cars were cheaper because end-welded studs were used.



One of the hundred stock cars on which end-welded studs were used for securing side slats and flooring to the steel car structure.

By R. L. JACOBSEN,
Mechanical Engineer,
Denver and Rio Grande Western

A net saving of $70.52 per car was achieved recently by the Denver and Rio Grande Western through use of stud welding to secure wood flooring and side slats in 100 new double deck stock cars. Savings directly attributable to stud welding, taking into account direct labor and material costs encountered in the present and previous fastening methods, were approximately seven per cent for the entire 100 car building program. Stud welded fastenings reduced the lead time required to set up the line by eliminating punching of posts and braces making possible a faster production schedule with a minimum labor force.

Approximately 35,000 Nelson ½- and ⅜-in. granular flux-filled studs were used in the newly-designed cars built at the Burnham Shops in Denver. Because the upper deck has been raised higher than in previous cars of the same general type, there is clearance for cattle on the lower deck and plenty of room for hogs or sheep on the second deck. Smaller animals also can be transported on both decks. The studs were end-welded to the steel framing through holes that were predrilled and countersunk in the wood. Nelson watertight nuts with tapered

SIDES . . .

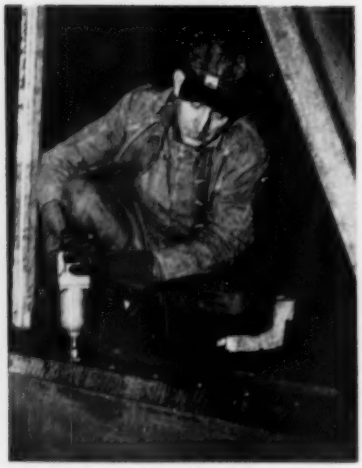
Jig used at Burnham shop to lay out the side slats and drill and countersink them for the application of studs. Track mounted drill can move over the entire jig and is guided by a simple fixture.

Semi-circular cutouts in the drill fixture located the holes in the slats which were clamped in the jig. A step drill was used to do both the drilling and the countersinking in one operation.

FLOORS . . .

Flooring cut to length for application to the D&RGW stock cars was drilled and countersunk in the wood shop before the material was moved to the assembly line for application. Car ends were undercoated—not lined.

Welding of studs through the predrilled holes was done after the flooring was placed in the car and jacked into position. Flooring application was completed before the side slats were applied.



Watertight nuts run down on the flooring after the end-welded studs were installed completed the floor. Upper deck of these double deck cars was assembled in much the same way.

shanks designed to fit snugly into the countersunk holes were run down on the threaded studs. The nuts used to secure the decking and side slats had out-of-lead threads which locked upon the stud threads to prevent the nuts from loosening because of vibration.

Labor Costs Reduced

The studs and nuts for the flooring application actually cost $21.00 more per can than the clips and bolts required by the previously used method. However, by using the welded studs, the number of man-hours per deck was reduced from twelve to five. This saving resulted in a direct labor cost reduction of $29.92 per car, exclusive of overhead. Stud welding material for the side slat application actually cost $14.00 more per car when compared with conventional bolts and nuts. Again man-hour savings were substantial—eight hours per car. Total direct savings on each car, including elimination of punching time, amounted to $75.60 without overhead.

End-welded Nelson studs eliminated all punching of the steel members to accommodate bolts. Stud welding was faster, safer, and less fatiguing than alternative fastening methods would have been. It was performed entirely inside the cars. Fastening of much of the flooring by previous methods would have had to be done underneath the cars where many obstructions are encountered and where work must be done overhead. The one-side stud welding operation left the exteriors of the framing members smooth and without holes. Since there are no bolt holes in the steel or protruding nuts or bolt heads, rust pockets were eliminated and painting has been simplified.

Predrilled and countersunk side slats held in proper positions by temporary cleats tacked in place. Moved to the car this way, they were held in position on framing with C clamps.

Welding operation utilized the Nelson welding tool and the accurately drilled holes in the side slats served as the template to properly locate the studs on the car framing members.

Watertight nuts used with end-welded studs have tapered shanks fitting snugly into countersunk holes in side slats. They are driven with this air-operated driving tool.

Servicing tracks at Jacksonville are next to ACL yard. Lined up are not only mechanical cars of the BRE-FGE-WFE companies, but those of other operators.

Servicing building at Jacksonville contains not only stock of parts for running repairs, but has the shop for heavy rebuilding of engines and compressors.

BRE-FGE-WFE Have This Vital Job . . .

TO KEEP 'EM FREEZING

Over a thousand mechanical refrigerator cars operated for 70 contract railroads are kept running with almost no failures and handle a growing volume and variety of loads.

Over a million tons of commodities have been handled over 60 million car-miles by the 1,001 mechanical refrigerator cars operated by the associated Burlington Refrigerator Express, Fruit Growers Express and Western Fruit Express companies. This transportation job has been done in nearly 32,500 car loads over the seven years since the first shipment was handled in a general service mechanical refrigerator car on Feb. 25, 1949. In this time not a car load has been spoiled by refrigeration failure.

How has this been possible? It has been achieved because of the reliable equipment available and used in mechanical refrigerator cars such as the FGEX 1201-1600 series described last month. It has been accomplished because BRE-FGE-WFE management

Fuel is stored in elevated tank and is then piped along the servicing tracks. FGE has found that No. 1 diesel oil guarantees reliable engine operation.

Fueling cart has meter and is easily moved from car to car. It is connected to one of fuel outlets which are spaced about a car length apart along the tracks.

NOW . . . CLASSROOM ON WHEELS

Successful mechanical refrigerator car operation on the contract lines of the BRE, FGE and WFE has depended to a large extent on the training of the men who service and maintain the cars. While cars are being built in the company shops, groups of men have been brought in from outside points for about two days so they can familiarize themselves with the refrigerating equipment.

The training program has had two branches. Service department men, who inspect and service the cars under load are trained to recognize and diagnose trouble and make emergency repairs. The employees of the mechanical department give the cars pretrip inspection and service at terminals when not under load. These men are trained to make all repairs. Supervisors of the maintenance operations are sent to short intensive training courses conducted periodically by Frigidaire and Detroit Diesel. These cover trouble shooting and preventive maintainance.

FGEX 1600 has just been outfitted for training purposes—aiding in the instruction for all employees. The interior of this car has been equipped to be a "Classroom on Wheels" for lectures and visual aid training. All important machinery parts are available for observation under simulated working conditions. The car has fluorescent and auxiliary lighting, folding chairs, workbench, and working tools. In the car are the following: cutaway diesel engine, condensing unit with cutaway compressor, blower, evaporator with refrigeration panel, motorized diesel fuel system with pressure gauges, transparent viso-trainer refrigeration system with pressure gauges, trans-indicator lights to shop operation sequence, and cutaways of electrical and refrigerant controls.

This instruction and demonstration car is to cover all principal service and repair stations and shops —to afford each employee an opportunity to learn all about the servicing and maintenance of these cars.

realized that special shops, equipment and servicing practices would be necessary for these special cars, and that men with special training would be needed to do the job. It demonstrates the interest, skill and aptitude of the men trained and assigned to the mechanical car maintenance and inspection. And finally it points out the importance of regular enroute checks.

The stakes are high. Frozen orange juice concentrate in one car easily represents ten to fifteen car loads of whole oranges. Claims against such a car if it should be spoiled enroute could easily amount to $25,000.

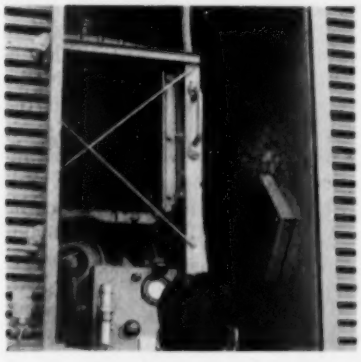
But the job is being done successfully. This method of transportation was pioneered by the BRE-FGE-WFE organization at the request and with the cooperation of the frozen citrus juice concentrate producers in Florida and other processors and shippers of frozen commodities. Today most of the cars are still busy handling frozen foods; but a wide variety of fresh fruits and fresh vegetables, meats, candy, chemicals, drugs, and evergreens and nursery stock also have moved in them. The movement of frozen citrus concentrates from the state of Florida is still the biggest single job done by this car fleet. These loads go to all states, to the District of Columbia and into Canada. Second

(Text continued on page 66)

This Inspection Is Made Enroute . . .

Check of loaded mechanical car is made while other refrigerator cars in the same train are being iced. It begins by rolling back louvered door on the engine side of the machinery compartment.

Trip log book comes from holder at right. Two pilot lights show both compressors are operating. If both are out and third is lighted, car is in its defrost cycle, but operating satisfactorily.



FRUIT GROWERS EXPRESS COMPANY
WESTERN FRUIT EXPRESS COMPANY
BURLINGTON REFRIGERATOR EXPRESS COMPANY

Car Init. & No. WFE 8037

PRE-TRIP, ENROUTE AND DESTINATION INSPECTION REPORT — MECHANICAL REFRIGERATOR CARS

Type of System — REFRIGERATION [X] Unit Serial Nos. R _____ I _____

LOADING DATA

Origin Kent, Wash. Destination Jacksonville, Fla. Routing GN CB&Q RCStL CGa WDS SAL
Shipper Stokely Van Camp Consignee Stokely Van Camp % Setzers Whse.
Commodity Frozen vegetables No. Pcgs 3750 cases Weight 50,125 Waybill No. & Date 8821 3-16-56
System started by Gilder Station Kent, Wash. Date 3-15-56 Time 2 PM Thermostat setting 0

PRE-TRIP INSPECTION

Station Delta, Wash. Date 2-21-56 Thermostat setting 0
Fuel Added 153 Gals. Lube Oil Added _____ Qts.
Engine Hrs. — R 5803 L _____
Engine Hrs. Reading last oil change 5133
Signature Day
(Name of employee making Pre-trip inspection)

TYPE OF INSPECTION MADE: Pre-Trip X; 250 hour; 750 hour; 1500 hour

IMPORTANT — TYPE INSPECTION — THE WHEN CAR IS EMPTY AND ENGINE HOURS TOTAL: R / L

250 hr.
750 hr.
1000 hr. 6133

ENROUTE INSPECTIONS

(1) Railroad on which service performed	(2) Station	(3) O.S. Temp.	(4) Date	(5) Time	(6) Car Temp. Top	(6) Car Temp. Bot.	(7) Head Pres.	(8) Tank Pres.	(9) Volt. Amp.	(10) Engine Hours	(11) Oil Press.	(12) Eng. Temp.	(13) Fuel in Tanks	(14) Fuel Added (Gals.)	(15) Lube Oil Added (Qts.)	(16) Name of Inspector	(17) Performance (If Unsatisfactory Explain on Reverse Side)
GN	Interbay	38a	17	8a	0	8b			N	5641		180	310			Robinson	
"	Appleyard	38a	18	2a	8b	6b			N	5668		180	300			Reeds	
"	Whitefish	22a	19	2a	4b	5b			N	5686		140	280			Reed	
"	Williston	30a	20	7a	5b	7b			N	5714		140	265			Tefte	
"	Willmar	35a	21	10a	5b	6b			N	5741		180	205	194		Bromen	
"	Mpls.Jct.	30a	21	5p	5b	6b			N	5748		158	385			Schwab	
CBQ	Day.Bluff	28a	22	8a	5a	5b			N	5781		180	380			Olson	
"	Galesburg	36a	23	3a	4b	5b			N	5798		180	350			Olinger	
L&N	Nashville	48a	24	6a	8a	4b			N	5809		160	320			Adams	
NC	Atlanta	48a	24	6p	7b	6b			N	5819		160	310			Lowe	
SAL	Jacksonville	54a	26	9a	5b	6b			N	5860		160	265			Griner	
"	"	82a	27	2b	8b	3b			N	5868		270	230			Griner	

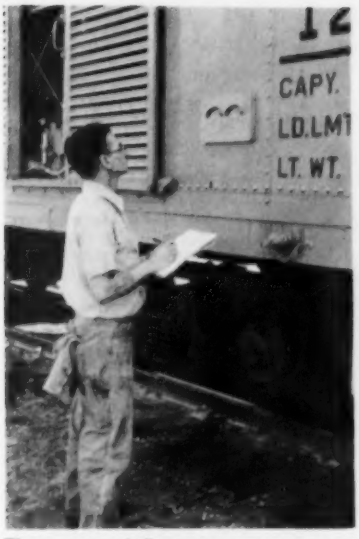
RETENTION — 1st Stop Date Hour; 2nd Stop Date Hour; 3rd Stop Date Hour

At Intermediate Stop, Held or Reconsigning Points:
Arrived in Terminal Train Yard
Disposition Instructions Received
Diversion Charge

At Final Destination Station Jacksonville, Fla.
Arrived in Terminal Train Yard Date 3-26 Hour 1 am
Consignee Notified of Arrival Date 3-26 Hour 9 am
Car Placed for Unloading Date 3-26 Hour 2 pm
Unloading Completed Date 3-26 Hour 4 pm
Diversion Charge $ 7.50

Destination Inspection
Equipment Stopped, Date 3-26 Hour 8 am
Engine Hours R 5868 L _____
Fuel in Tanks 205 Gallons
Inspector Griner

Original to be removed at destination and sent to General Superintendent. Destination Agent to prepare exact copies and send to Auditor F. C. A., General Manager, General Superintendent, General Superintendent, and Manager General Agent — WFE; at Destination District, if any exists in vicinity of road, route Auditor F. C. A. IF ANY DIFFICULTY ENROUTE REPORT IMMEDIATELY TO MANAGER GENERAL AGENT — WFE; GENERAL SUPERINTENDENT AND GENERAL MECHANICAL SUPERINTENDENT

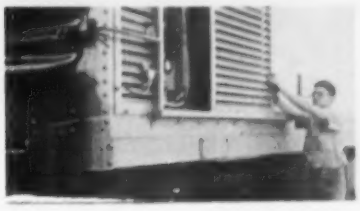


Thermometers indicate temperatures at top and bottom of the cargo space. Instead of this open-dialed Liquidometer thermometer, some cars have instruments which have protective covers.

Elapsed engine hours at time of inspection are recorded on trip report. This information comes from indicating meter, standard instrumentation on the Detroit diesel alternator power plant on this car.

Fuel level in 400-gal. tank is indicated by Nathan gauge similar to type used on diesel locomotives. Except on cross-country trips, it is usually not necessary to add fuel enroute.

Car is operating satisfactorily — this was shown in log book now back in place in its holder. Machinery compartment door is closed and FGEX 1251 is ready to go on.



Servicing station at Baldwin was constructed to handle growing fleet of cars. Adjacent to Seaboard yard, this plant cleans, fuels and checks mechanical refrigerator cars.

Truck is equipped for trouble shooting; works in north and central Florida. Many mechanical car components, Freon tanks, and stock of tools are available on it.

in volume has been the movement of frozen fruits and vegetables from Washington and Oregon to eastern destinations.

Origin and destination do not alone determine the routing of the mechanical cars. A typical trip with frozen concentrate from Florida would find the car going through the icing stations along with the standard refrigerator cars because the mechanical car usually moves in the same highspeed trains. Icing is done at 24 to 36-hour intervals. On the Fruit Growers Express contract lines, these icing operations are handled by the refrigerator car company. At each icing station, trained BRE, FGE, or WFE men inspect the mechanical cars—checking the temperatures, fuel supply, and engine and compressor operation. These inspections are recorded on the trip report in a log book which accompanies each car. Repairs and minor adjustments may be made. At destination the diesel engine is shut down by a representative of the car line or by the receiving railroad or the consignee in some cases.

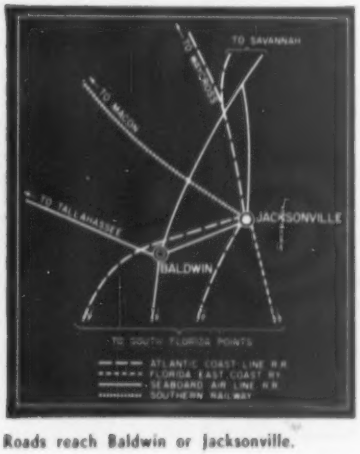
Cars returning to Florida for reloading are all directed through Jacksonville or Baldwin. The FGE repair tracks at these two points have been provided with additional specially-equipped tracks for servicing the mechanical cars. Jacksonville and Baldwin are strategically located because they lie astride the routes over which almost 100 per cent of the Florida perishable traffic moves.

The Jacksonville installation is adjacent to the Atlantic Coast Line yard and the Baldwin installation is a part of the Seaboard's major Florida classification yard. Each of the servicing installations has a 15,000 gal. diesel fuel tank with fueling outlets along the tracks, 220-v a-c wayside plug-ins, and a shop building where stocks of spare parts are kept. Each of these maintenance and servicing stations is a one-shift, day-time operation. As each mechanical car arrives in the yard on its empty, southbound trip, the railroad switches it into the FGE servicing track.

Engine compartment doors are opened on each car and with the information from the log book in the engine compartment and from the elapsed-hour meter on the engine, it is determined if this is a routine inspection, or if the car is due for periodic maintenance which is to be described later. If no periodic maintenance is due, a "Pre-Trip Inspection Check Sheet" is placed on car.

The car is started, operated and shut down. Brackets and equipment mounting are checked. The car is fueled, and oil and cooling solution

(*Continued on page 69*)



Roads reach Baldwin or Jacksonville.

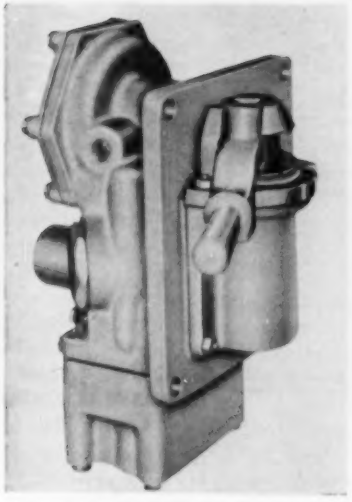
PRE-TRIP INSPECTION
Items Checked on Frigidaire-Equipped Cars

ENGINE INSPECTION
- Lube oil level
- Coolant level and freezing point
- Inspect Air Inlet Elbow
- Air Box Damper—Must shut car down when closed and must be open when the car is released.
- Drain Primary and Secondary Fuel Filters
- Check Battery gravity and electrolite level
- Check for security of mounting and oil leaks: Manifolds, Starter, Battery Generator, Engine Belt Guard, Fuel Lines and Filters, Engine Mounting Bolts, Air Cleaner, Overspeed Relay, Valve Cover, Damper Solenoid, Hot Wire Relay, and Engine Blower.

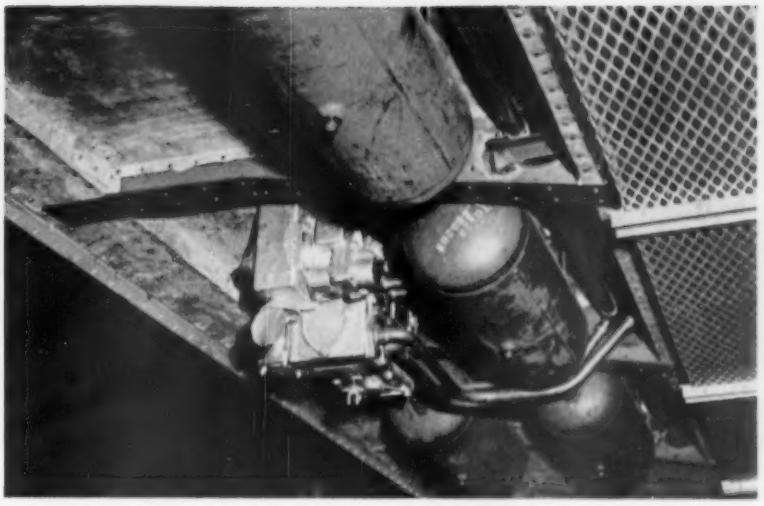
ALTERNATOR AND ACCESSORIES INSPECTION
- Alternator End Bearing oil level Control Box Lever should be in *OFF* position.
- Instruments—Voltmeter should read zero
- Remove Alternator Hand Hole Covers, inspect rings and brushes (for wear and Sticking).

REFRIGERATION EQUIPMENT INSPECTION
- Compressor oil level in sight glass
- Refrigerant level in sight glass
- Inspect Lines and Seals for leaks
- Inspect Blower Fans and Pulleys for security on the shaft.
- Inspect Evaporator Pan Lip for cracks.

GENERAL INSPECTION
- Fuel Tanks—Security of Mounting, Leaks, Fuel Level.
- Locks on Engine Compartment and Control Panel Doors.
- Start Engine and Record: Head Pressure, Suction Pressure, Oil Pressure, Engine Temperature Volts, Cycles per Second and Amperes.



Brake valve has square flange for installation in the locomotive cab.



Underbody installation of the 26 equipment on Talgo coaches of the ACF-built Jet Rocket for the Rock Island.

For Lightweight Trains . . .

The 26 Brake Equipment

The 26 Brake Equipment has been developed by Westinghouse Air Brake for the lightweight locomotives and cars operated in unit trains. It will operate in complete harmony with conventional passenger brake equipment. The two main components are the 26A self-lapping type Brake Valve and the 26 Control Valve. In keeping with the general aim of weight reduction on these unit trains, the 26 Brake Equipment represents a 60 per cent weight reduction over the brake equipment used on conventional passenger trains.

This is achieved by design simplicity featuring a self-contained relay style of equipment using diaphragms and O-rings that eliminate all ring packed pistons and slide valves. These design advances are intended to give the purely automatic pneumatic brake greater sensitivity and reliability so that, for lightweight trains, brake application and release rates are comparable to those attained with electro-pneumatic straight air brake. The equipment is designed for use as an automatic pneumatic brake for modern passenger train lengths such as are being introduced in segregated service. Electro-pneumatic transmission can be added for longer trains or where desired.

Fast application time is obtained by a positive quick service function, transmitted at a rate approaching the emergency rate of conventional equipment. Serial pneumatic release operation is obtained at a rate only slightly lower than that of the rapid application. Quick service is initiated by light brake pipe reductions, developing initial brake cylinder pressure sufficient to provide prompt brake cylinder piston movement with immediate brake shoe contact with the wheels. Stability under such high speed transmission is an outstanding contribution of the new diaphragm design.

Following the almost instantaneous development of 8 to 10 psi minimum brake cylinder pressure, further build-up of brake cylinder pressure is at a rate compatible with that of the D-22 Control Valve. Full service reduction provides 60 psi brake cylinder pressure. Because of fast automatic emergency transmission, brake cylinder pressure is developed at a very fast rate from either the brake valve on the locomotive or emergency valves on the train.

26-A Brake Valve

The 26-A Brake Valve is a self-lapping automatic brake valve with which small increments of brake pipe pressure change can be obtained. It has four handle positions from left to right—*Release, Service, Suppression* and *Emergency*. Lap position is omitted as that function is automatically performed by the brake valve itself. Service position comprises an arc extending from *Release* to the first handle position notch, *Full Service*. The handle is moved to the right toward this notch for brake application and back to the left for release. The degree of equalizing reservoir reduction and subsequent brake pipe reduction is automatically determined by the amount the handle is moved to the right.

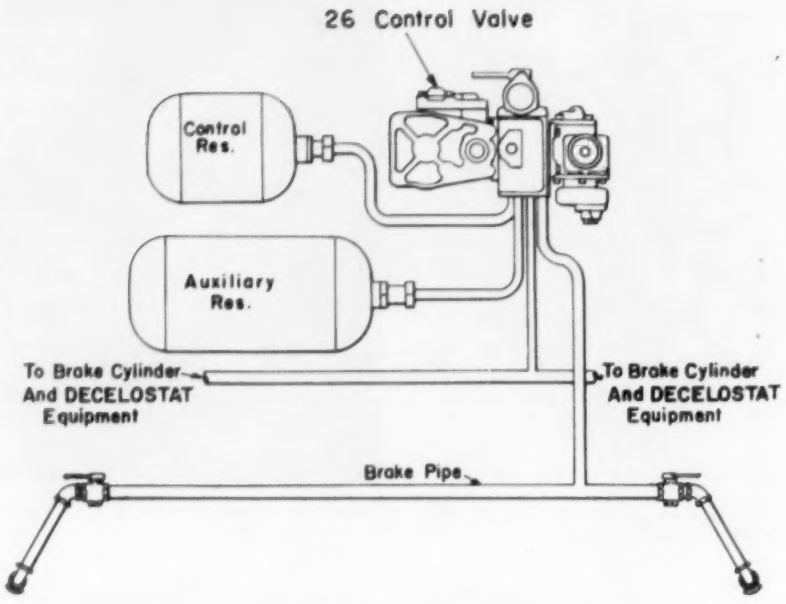
Graduated release is obtained by movement of the handle in desired steps toward release position. Numerous graduations may be made until the brake pipe pressure is fully restored. Full release and quick release

are obtained by moving the handle directly to release position.

No feed valve is required with the 26 Equipment. An adjustable portion for selection of desired brake pipe pressure is incorporated in the brake valve. *Suppression* position provides the interlocking function associated with Safety Control, Train Stop, etc.

Emergency Position provides for rapid venting of brake pipe pressure and direct equalization between auxiliary reservoir and brake cylinders. An emergency cam on the handle insures direct emergency action of the equipment.

The 26-A self-lapping Brake Valve together with the fast transmission rates of the 26 Control Valve produces an automatic brake of great flexibility heretofore unattained in an automatic air brake. The brake valve is provided with a flanged face for flush mounting on the instrument panel. Its weight is 32 lb and its compactness is indicated by its dimensions—12¼ in. high x 7½ in. wide x 6¾ in. deep.

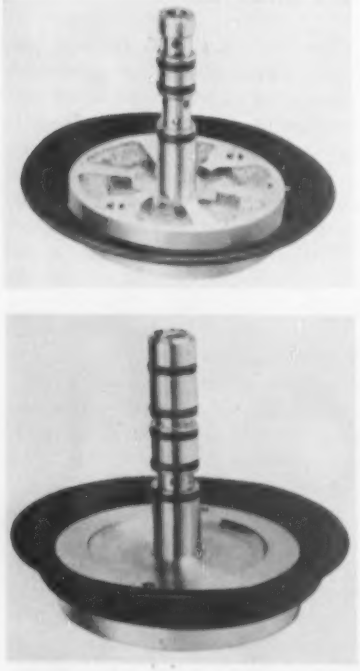


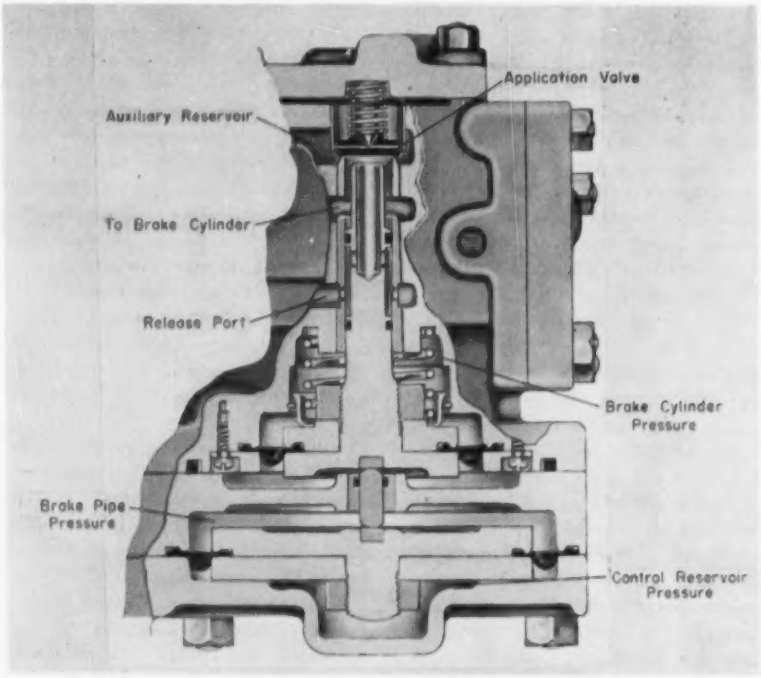
Typical car installation for 26 equipment demonstrates its simplicity.

26 Control Valve

The 26 Control Valve consists of pipe bracket, a control portion and an emergency portion. Its weight is approximately 100 lb. A reservoir release valve is attached to the control portion. A removable brake pipe combined strainer and cut-out cock is attached to the pipe bracket.

A control reservoir, charged to brake pipe pressure, is connected to the face of the service piston. This reservoir controls brake applications and releases, and supervises the relay function which is also grouped in the control portion of the valve. The combination of functions together with design simplification eliminates considerable piping and conserves space.



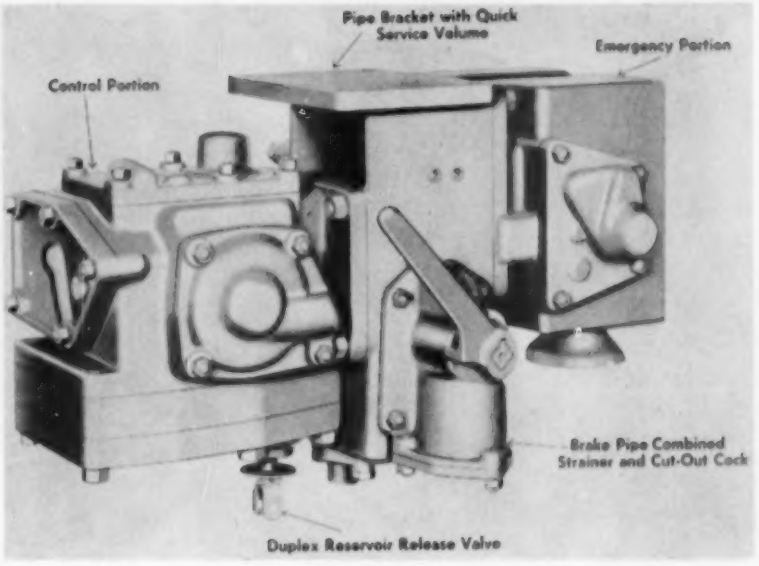


Diaphragms and O-rings are used in control valve components such as the vent valve (left above) and charging valve (left below). At right is section of Control Valve showing how control reservoir pressure acts on the service piston.

With the control reservoir acting as the control medium, brake cylinder pressure developed is always in a fixed ratio to brake pipe pressure change during brake application and release, regardless of brake cylinder volume and location in the train. This construction also provides for automatic maintaining of brake cylinder pressure against leakage.

Auxiliary reservoir recharge is related to the release of brake cylinder pressure. During release, the auxiliary reservoir recharges from the brake pipe in the same ratio as the brake pipe is restored. Release of brakes is always proportionate to the recharge of brake pipe on all cars.

The 26 Control Valve has sufficient capacity to handle a 16-in. brake cylinder and is adequate for the cylinder volumes normally used on modern trains. Since the 26 Brake Equipment operates on the well-established automatic system of brake control, it is compatible with existing railway brake equipments. At the same time the 26 equipment design makes possible considerable reduction in both size and weight.


Pipe Bracket with Quick Service Volume
Emergency Portion
Control Portion
Brake Pipe Combined Strainer and Cut-Out Cock
Duplex Reservoir Release Valve

Control and emergency portions of 26 equipment mount on pipe bracket.

Mechanical Refrigeration

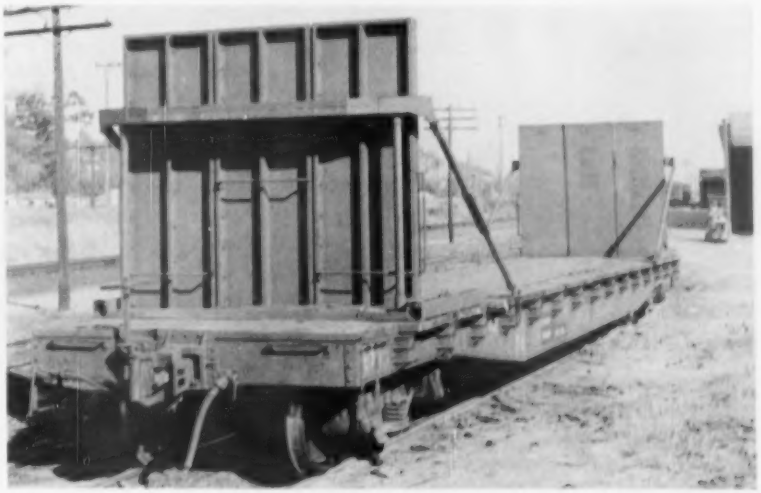
(*Continued from p 66.*)

are added to the engine if necessary. The starting battery is checked. Operation of the engine, alternator, and refrigeration equipment are noted. If no repairs or replacements are necessary, the log sheets for the completed trip are removed from the log book. The new report is started by carrying over necessary information. Finally, if the car is to be loaded in north Florida, it is started while at Jacksonville or Baldwin. If it is to get its next load in central or southern Florida, it is forwarded with the engine shut down. It will be started by FGE men at places such as Wildwood or Lakeland—points where FGE has icing stations, and points where ice refrigerator cars are iced before being switched to the shippers' plants for loading. When the mechanical car arrives at a shipper's loading dock, it will be running and ready for load.

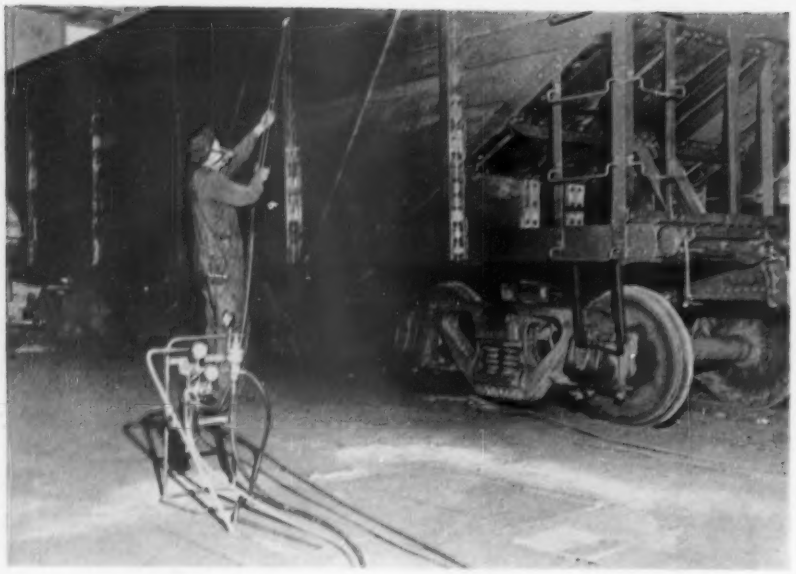
This operation is becoming a familiar routine for Fruit Growers Express. In most cases railroads handling mechanical cars should have no reason to do any work or make any adjustments on the refrigeration or generating equipment. Even in cases where a car shuts down, the car's design and insulation will protect a lading for many hours. The car probably can be forwarded to a point where a representative of one of the refrigerator car lines, or of the manufacturer of the engine or refrigeration equipment is available. A recent AAR rule change requires that manuals covering the mechanical and electrical equipment be carried on each car. If past experience is any guide, there shouldn't be too many occasions when railroaders will have to use this book.

CORRECTION

In the AAR Mechanical Division axle report, "Does Penetration or Crack Come First?" the following sentence appears in the third paragraph on p. 65 of the August issue: "After inspection of 70,000 cars the ratio of defective axles found has been reduced from 1 cracked axle in 400 cars to 1 in 2,580 cars." The last figure should be 580 cars.



Any flat car can be a bulkhead car using the Hallgate units which lock into stake pockets and can be set to match the length of the lading.



Pole in hand, a Monon painter completes the hoppers from the portable paint station. All sides and ends of the cars can be sprayed. Working from this point he can handle any one of four cars on either track.

Monon Paints Right from the Barrel

The Monon claims to have increased the production efficiency of the Lafayette paint shop by eliminating manual paint mixing and manual transfer of the paint from the central source, and by supplying the paint direct from the shipping drum to the guns without the necessity of refilling paint pressure tanks. This was all made possible by installing a Binks integrated paint circulating system.

Two complete paint circulating loops have been built into the shop floor. A pair of parallel pipe lines carry primer and finish coat to four different paint stations on the line. A third pipe, line in the system provides compressed air to the stations as well as to the pumps, agitators, and elevators.

Two air-operated pumps continuously circulate the paint through the lines. The pumps and agitators are mounted on drum covers, fitting directly onto the 55 gallon drums. These covers, in turn, are connected to air operated pump elevators which lift the entire assembly to allow the replacement of empty drums with full ones.

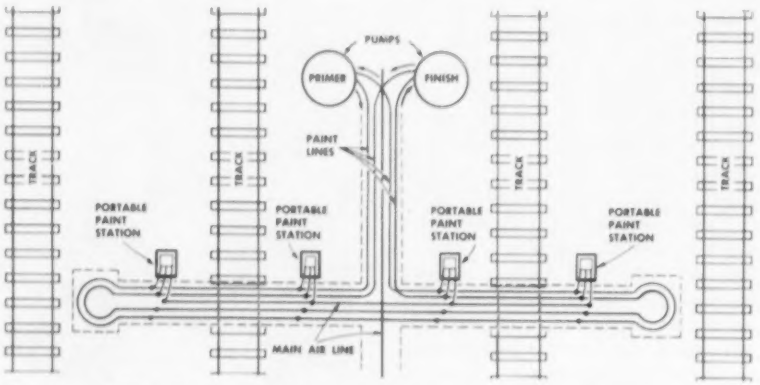
Each paint station consists of a portable metal rack carrying a paint regulator and an oil and water extractor. Attachments to the paint and air lines are made by quick detachable connections. One man with 60 feet of air and paint lines can reach four cars from a single station as the paint station is located between each pair of tracks.

The basic spray tool is a Binks Model 24 pole gun with large capacity, internal mix type nozzles. Various gun lengths have eliminated scaffolding while the low air pressure atomization is reported to have reduced overspray considerably.

In this shop all guns spray identical finishes. The regulators control fluid pressures to such a degree that there are said to be the same even results regardless of the portion of the car being painted.

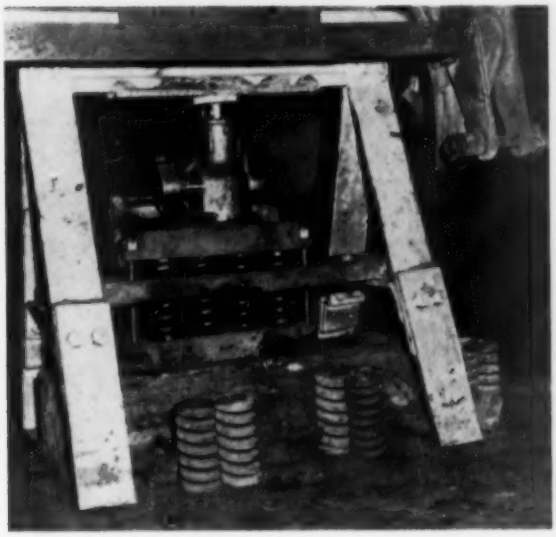
With the paint circulating lines under the floor and only the one set of paint drums located against a central wall, the shop floor is free of obstructions and at the same time fire hazards are reduced to a new minimum.

An installation of this type can be planned to accommodate any number of spray guns over any distance required. W. W. Brown, president of Monon observed, "Our experience with this equipment indicated that we have approximately doubled our painting output, and are saving about 20% on paint used for each car."

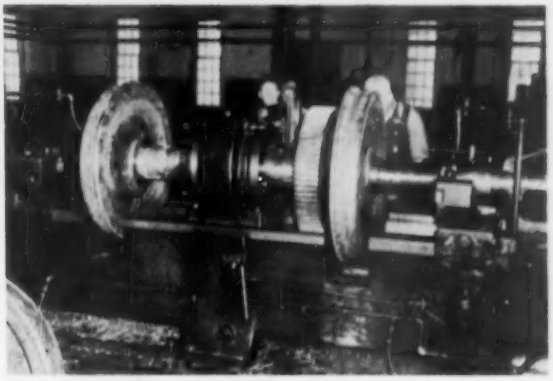


This plan of Monon's paint circulating system shows the four paint stations located between the tracks. Circulation of the paint is maintained by the pumps.

Ideas for the Diesel Repair Man...

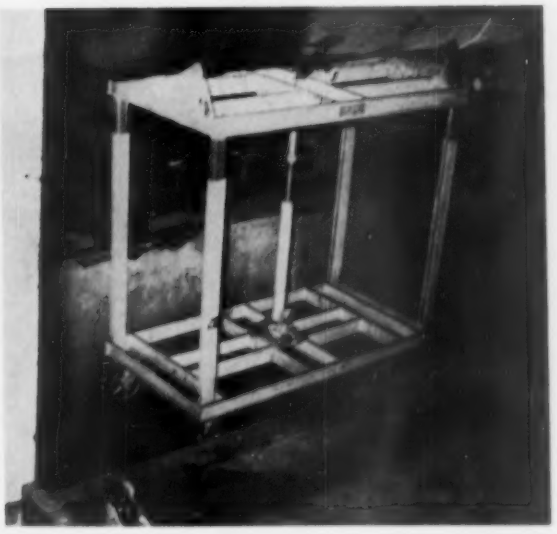


◄ Handy arrangement for squeezing traction-motor support springs. The jack pushes against a ½-in. plate welded to the bottom of the upper member of the steel horse on which the truck frame rests. The wood block rests on 1-in. plates across the bottom. The safety straps running across the jack at the spring level are ⅜ in. by 2 in.

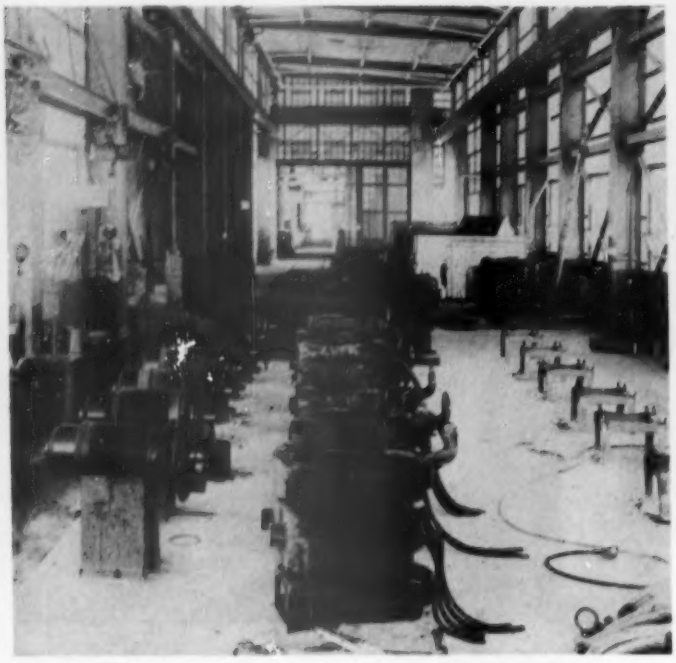


▲ Turning and burnishing outside 7- by 14-in. diesel journals on a Betts-Bridgeford journal lathe.

▲ Layout for testing tightness of seals on Alco liners on wheels (1) to move it out of the way when not in use (2) for movement to the nearest drain for emptying water after test. The wedge-shaped block holds the cover in place and has a pet cock (which can be seen on the one on the right lying on its side) to relieve the air while filling. Two cylinder assemblies are tested simultaneously with shop water pressure of 60 psi.



▲ Main reservoir jack operates with a small hydraulic cylinder. The Pittsburgh & West Virginia built this device to fit in the pits along the locomotive shop track. After the reservoir has been dropped, it can readily be rolled out to an area where hammer and hydro testing is done. The overhead crane is no longer needed; in fact, one side of the locomotive could never be reached by the crane and blocking had to be used to remove the reservoir.



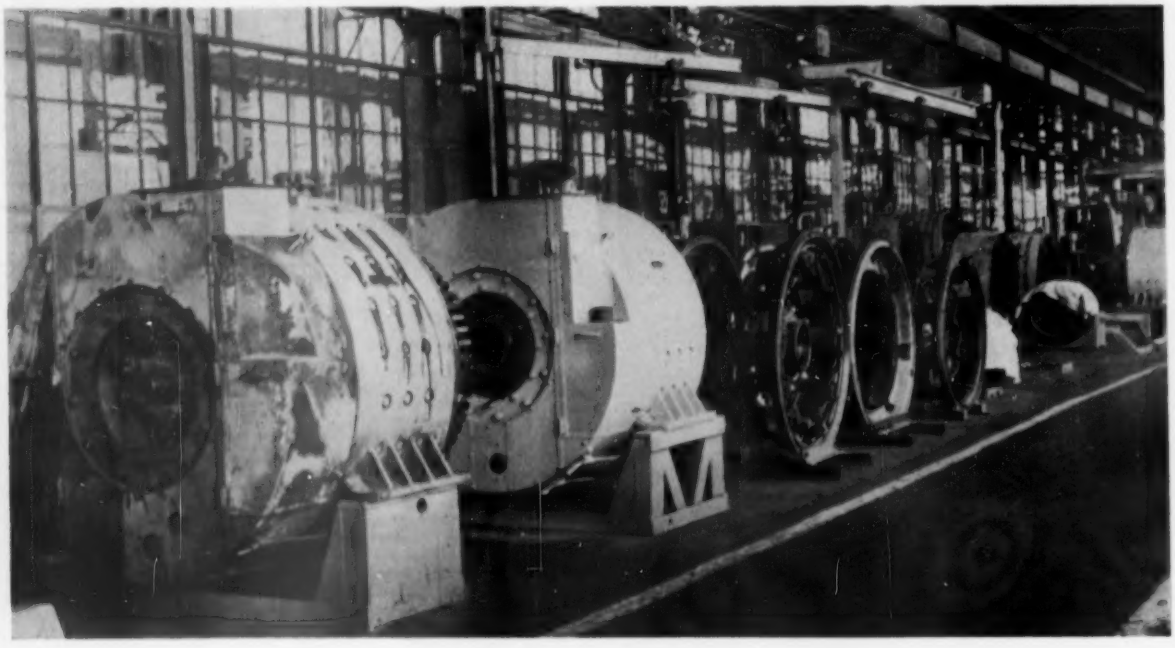
Armatures pulled and mounted on stands close to work benches

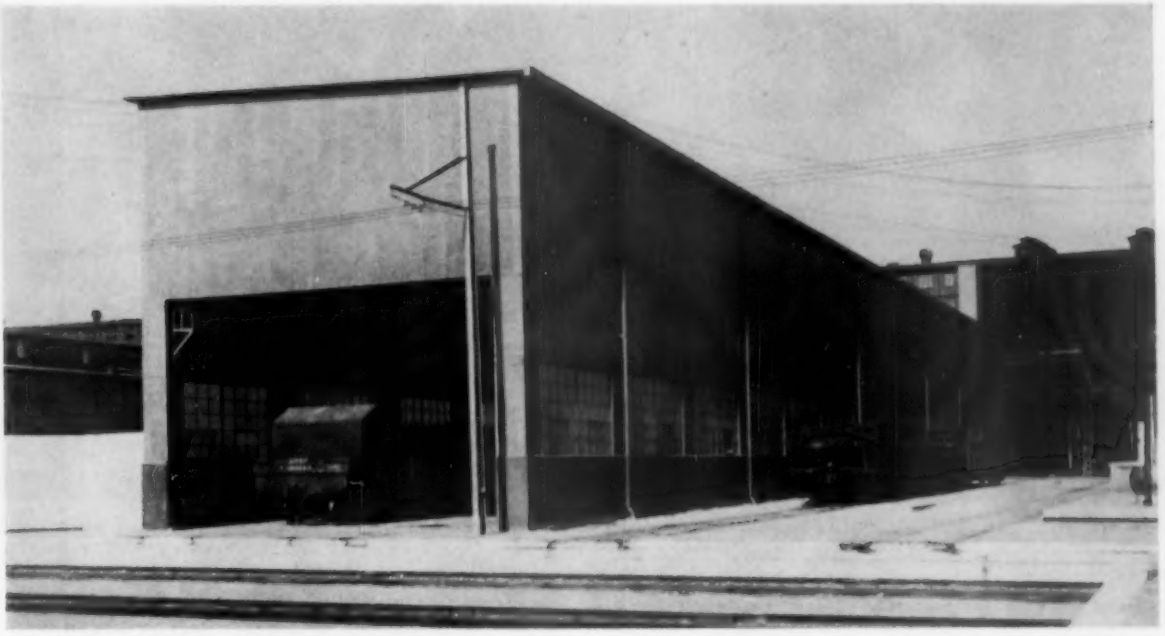
For a Clean and Orderly Shop

Santa Fe adds new building to isolate the stripping and cleaning of traction motors and generators

AN IMPORTANT ADDITION to the Santa Fe electric shop at San Bernardino, Cal., was constructed recently for the purpose of centralizing and expediting all stripping and cleaning operations at one point before diesel traction motors and generators are taken in the main shop for repairs. A bottleneck in overall shop production is thus

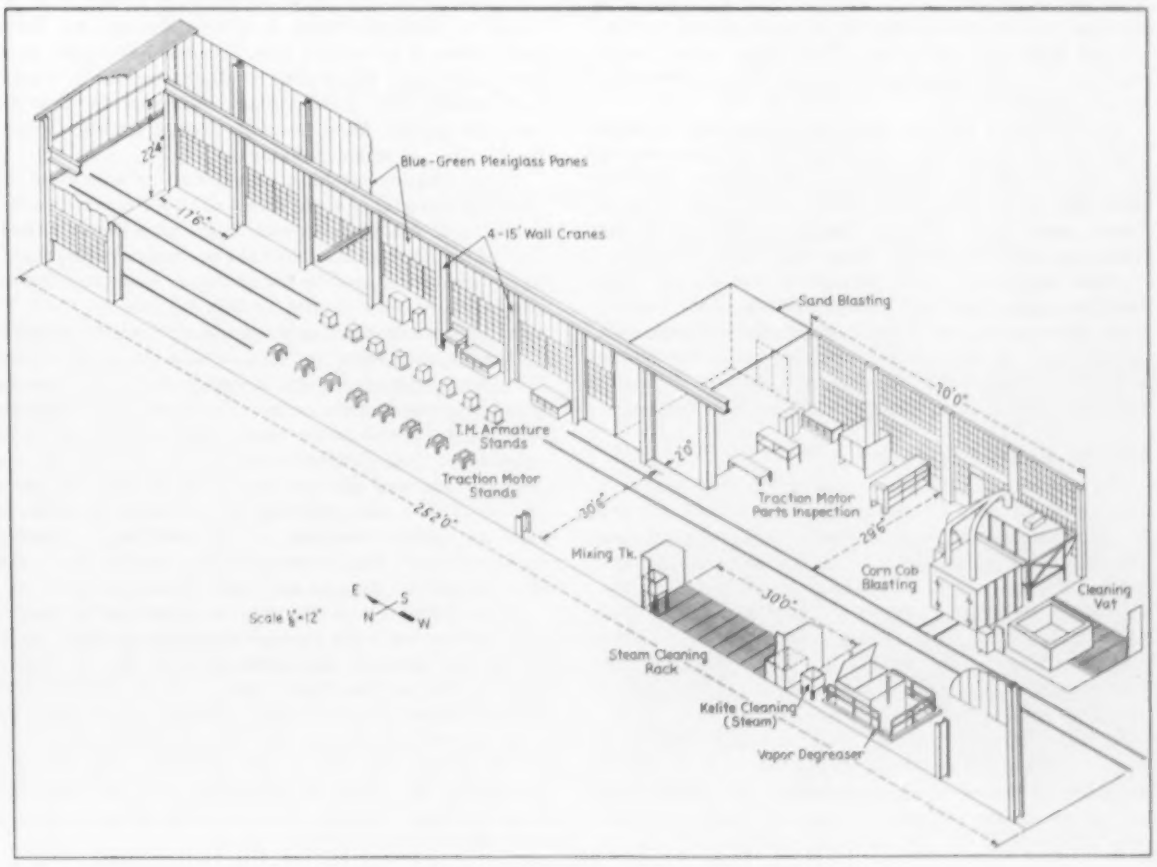
Section of the main electric shop where generator repairs are made

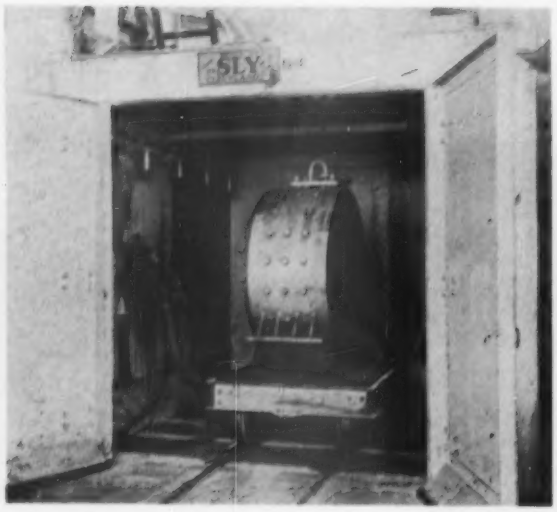




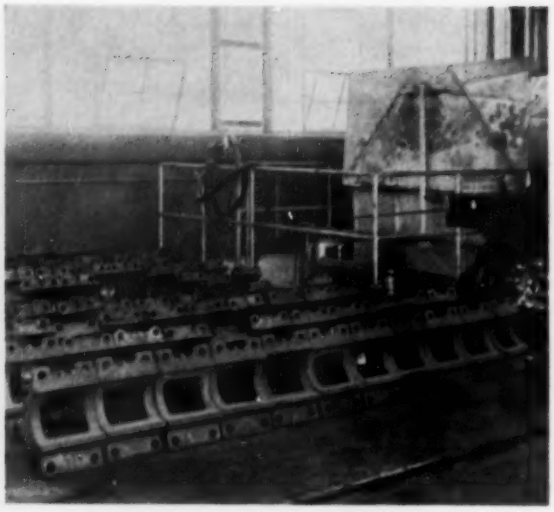
New Santa Fe traction motor stripping and cleaning shop at San Bernardino, and (below) general arrangement of equipment.

removed and the main shop can be kept much more clean and orderly. About 250 traction motors are cleaned each month in the new facilities which are operated on two 8-hr. shifts, five days a week, using one electrician helper as crane operator, two electricians and one laborer on each of the first and second shifts.





Generator frame ready to be cleaned in the corn cob blasting machine



Axle support bearing parts lined up on the shop floor after cleaning

The new cleaning shop, 252 ft. long by 34½ ft. wide, is equipped with a 10-ton overhead traveling crane and has two receiving and shipping tracks entering the east end from the transfer table to accommodate special cars carrying electrical equipment between San Bernardino and other points such as Cleburne, Tex., Argentine, Kan., Chicago, and Barstow, Cal. These cars are older low-side gondolas arranged to handle 12 motors and one generator as a complete load. The car floor is made with shallow wells to receive the motors and generator so no special blocking is required. Sheet metal hoods, easily installed over the equipment, protect it from the weather during shipment.

In addition to the two tracks in the east end, a single track extends from about the center of the shop out the west end and directly into the main electric shop. Trailers with four flanged wheels are used on this track to move heavy parts such as motor or generator frames and armatures into the electric shop after being cleaned.

Other equipment in or adjacent to the electric shop includes: eight small but sturdy traction motor stands; eight armature stands; a 30-ft. steam-cleaning rack with mixing tank in one end and cleaning vat in the other; a Kelite machine which furnishes the metered detergent solution used in steam cleaning; and a vapor degreaser.

Five Methods of Cleaning

An extension on the south side of the shop houses a fully-equipped parts-inspection department and a small room partitioned off for sand blasting motor frames, due precaution being used not to sand blast or mar any machined surfaces. This extension also has a corn cob blasting machine and equipment. Just outside the wall are a large cleaning vat and an adjacent small cleaning tank, the latter being used solely for cleaning brush holders with immersion time limited to 10 min. and a follow-up steam cleaning required.

In operating this cleaning shop, a supply car from one of the outside points is moved into the shop and unloaded by means of the shop crane. Traction motors are placed on the stripping frames for removal of end bells after which the armatures are pulled and put on armature stands while the bearings are dismantled. Both frames and bearings are cleaned in the degreaser.

The vapor degreaser is used primarily for cleaning these traction motor frames. Since this process does not remove carbon residue or soap-base greases and causes extensive flaking of external paint, it is necessary to follow up with other cleaning methods for best overall results. The general condition of the frame after degreasing determines the follow-up cleaning method. If the frame is relatively clean, it is sent through the steam rack where it is sprayed with a metered detergent solution and steam. Older frames which are heavily loaded with innumerable layers of paint are sent through the corn-cob blaster. Main generator frames are also cleaned by blasting or steam cleaning.

In the blasting machine, grated corn cobs serve as the cleaning material and are directed by an operator using a 2-in. o.d. rubber hose with ⅜-in. pipe nipple nozzle. One of the illustrations shows the protective rubber hood, apron and gloves used by the operator. Generator frames can be thoroughly cleaned in this machine in about 30 min. while traction motor frames require only 15 minutes.

The large cleaning vat just outside the shop is used for cleaning bearing parts, housings and miscellaneous material such as studs, brushholders, etc. The medium-sized tank located at the steam rack contains a 50/50 solution of fuel distillate and cleaner. Frames heavily loaded with road dirt are immersed in this tank for a period of time not exceeding two minutes in order to facilitate further cleaning. In the small wing adjacent to the cleaning shop, bearings and grease retainers are cleaned, also oil slingers and other similar parts.

After stripping and cleaning, the motor and generator parts are moved to the big modern-equipped electric shop which the Santa Fe has constructed in the old boiler shop building at San Bernardino. Here a dielectric test is made of the fields and armatures which are rebuilt as required and placed on trailers for easy movement about the shop. On completion of repair work, reconditioning and testing, the motors and armatures are removed to the shipping track where they are loaded on outgoing special cars, as mentioned.

East portal of tunnel showing, at left, the building which houses the two 800-hp fan motors and control equipment.

GN Ventilates Tunnel . . . . . Abandons Electrification

Heavy freight trains are now moved with diesels through 8-mile tunnel against a 1.57 per cent grade

THE GREAT NORTHERN TERMINATED 47 years of electric operation in the Cascade Mountains in Washington on August 1. The discontinuation of the 74-mile electrified section between Wenatchee, Wash. and Skykomish, was made possible by the installation of a ventilating system which allows diesel locomotives to haul heavy freight trains against grade through the tunnel without overheating.

Basic units in the ventilation project are two six-ft fans installed at the east portal of the tunnel, at Berne. Powered by 800-hp electric motors and turning at 1,150 rpm, the fans force fresh outside air through the bore.

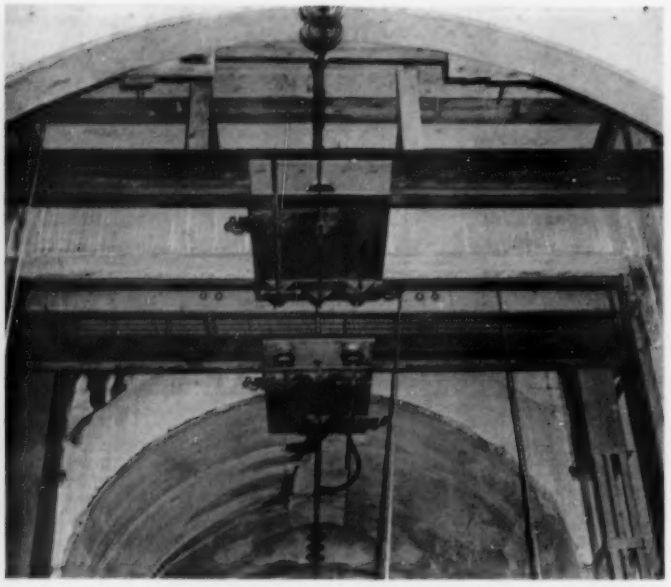
A building has been erected near the east portal to house the fan motors, electric switch gear and control mechanism, as well as a 1,200-hp stationary diesel for standby power.

The east portal has been reconstructed to accommodate a steel drop door, actuated by the operator at the west portal, which prevents the air blast from short circuiting, or circulating out the near portals and back to the fans. Cost of the ventilating system was $650,000.

What the Cooling System Does

From west to east, the track within the tunnel, which is laid with continuous rail, is on a 1.57 per cent grade. Some passenger trains have been diesel-powered through the tunnel for several years.

Fan housings and air ducts between the motor house and tunnel air inlet which is inside the steel door.



Steel door (left) at east portal has counterweights that open it automatically if power is interrupted or when automatic controls cut the circuit.

Above: Construction of new east portal for housing the steel door required frequent interruption of power in 11,000-volt trolley wire. This was done by installation of hinged connectors that could be swung clear and then reconnected.

Now, when a heavy-tonnage freight enters the west portal at Scenic, the operator there engages a master control, closing the east portal door and starting one of the fans, which forces approximately 220,000 cu ft of air per minute against the oncoming train. The introduction of a flow of outside air minimizes the piston effect of a train passing through the tunnel. For example, it was found that when the door was opened, a blast of wind estimated at 130 mph picked up stones and threw them with considerable force. As a safety measure the area at the eastern portal will be blacktopped.

Lighter trains will not require assistance from the cooling system, and all trains westbound downgrade are able to operate efficiently without aid of the fans.

After a train has passed through the tunnel in either direction, both fans can be operated to change the air completely within the bore. Together they force approximately 525,000 cu ft of air per minute through the tunnel.

The automatic features which come into play after the operator at the west portal has engaged the master control, include switch gear which opens the doors and turns off the fans when a train on the upgrade approaches within 3,250 ft of the closed portal. The fans will not operate without the door being closed. A stop signal within stopping distance of the door is provided in the event the door should fail to open despite its "fail-safe" design.

After a train has cleared the tunnel, the door is automatically closed and both fans are started for the air-changing cycle.

Design of the cooling system was based on studies made for the railway by International Engineering Company of San Francisco. The engineering company served as consultants during installation of the system by the Morrison-Knudsen Company.

Trolley Wire a Problem

Constructing the new portal and mechanism for housing the door required extremely close temwork between railway and contractor. The top of the tunnel was within 18 in. of the 11,000-volt trolley wire, requiring frequent interruptions of power. For this purpose, trolley terminals were installed at each side of the door housing. Whenever power had to be cut, two hinged conductors were swung clear of each terminal plate. They were reconnected when electric engines could again be allowed to pass.

The railroad expects that 100-percent dieselization of the electrified zone will produce substantial operating economies. The necessity of changing locomotives at Wenatchee and Skykomish is eliminated, as well as the maintenance of electric locomotives and related facilities. Another operating improvement is seen in winter snow removal; equipment with heavy outrigger blades will not have to be retracted to pass the poles, needed to support the catenary system in electrified territory.

With the changeover from electric to diesel operation in the Cascades, the Great Northern is now completely dieselized west of Minot, N. D.

The Cascade Tunnel ventilation project is the latest of numerous improvements that have been made over the years in the Great Northern's crossing of the Cascade mountains.

When the main line from St. Paul to Seattle was first laid across the Cascades in 1893, the major climb to Stevens Pass was accomplished through a series of switchbacks.

Construction of the first Cascade tunnel in 1900 eliminated the switchbacks. That 2.63-mile bore also shortened the distance 9 miles, reduced the maximum

(*continued on page 79*)

The locomotives are of the road-switcher type and are capable of performing both types of service.

Virginian Installs Rectifier-Type Locomotives

Railroad adopts now-available motive power which includes the advantages of high-voltage distribution, locomotive rectifiers and d-c motors

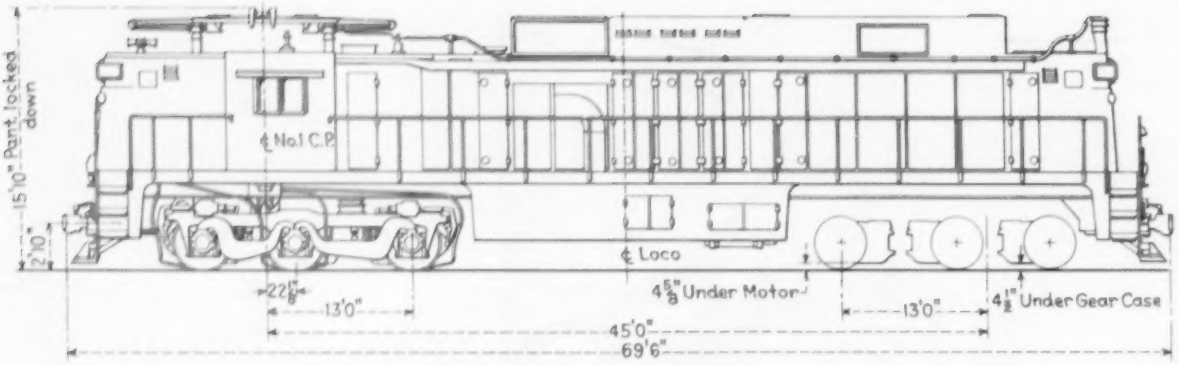
By J. P. Wiles

In June 1955, the Virginian ordered 12 rectifier-type locomotives for delivery beginning in October 1956. While basically similar to the New Haven locomotives, those for the Virginian are to be used in low-speed, heavy freight service instead of high-speed passenger service. In other words, this new type of locomotive has been accepted for practically all kinds of main line railroad work.

The original locomotives built for the electrification in 1926 were of the phase-converter type with induction motors for traction. These were supplemented in 1948 by motor-generator locomotives with d-c traction motors similar to those used on diesel-electric locomotives at that time.

One reason for the renewed interest in electric locomotives by the Virginian is the fact that both motor-generator and rectifier locomotives are able to operate efficiently

Mr. Wiles is in the Locomotive and Car Equipment Department of the General Electric Company, Erie, Pa.



Side elevation of a locomotive unit showing dimensions.

under existing high-voltage a-c trolley wire and, at the same time, make use of the standardized d-c traction motor with all of its inherent advantages.

The new rectifier locomotives are classified as road switcher types, with the operator's cab located between two hoods; one hood being longer than the other, as shown in Fig. 3. They will usually operate with the short hood leading.

Each unit is rated at 3,300 hp, has a maximum operating speed of 65 mph and a maximum tractive force of 98,500 lb.

From A-c Trolleys to D-c Motors

Power at 11,000 volts, 25 cycles is fed directly to the transformer. The secondary tap switches located on the transformer tank supply a variable voltage to the 12 ignition rectifier tubes connected 3 in a group in a bridge connection. The rectified power flows through a smoothing reactor to the six GE-752 traction motors, one on each axle. These motors are permanently connected two in series, three pairs in parallel. Speed-tractive force control is provided by tap changing on the transformer second ary, and by using resistors in series with the motor armatures.

The auxiliaries, such as the motor-generator set, compressor motor and equipment blower motor operate from a 196-volt tap on the transformer secondary. All of these are single-phase induction motors, thus eliminating maintenance of commutators and brushes.

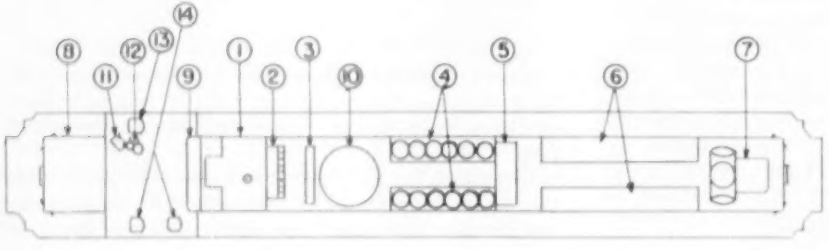
Since the locomotive is required to haul heavy tonnages over steep grades, the braking equipment is important. Standard 24RL brakes are used and sand is delivered to all axles for either direction of operation. Dynamic braking is included for speed control on descending grades. The motoring resistors serve also as braking resistors. They are forced-air cooled, the amount of air delivered to them being dependent upon the load they are carrying.

The single operating compartment, extending the full width of the platform, is placed next to the short end hood. Access can be obtained from either side of the locomotive, or from the nose. There are three seats in the cab, and windows are provided in both the ends and sides. The side windows slide horizontally allowing the operator further freedom of movement. The control stand and associated instruments are located on the right hand side facing the front end. Adequate cab heat, illumination and ventilation are provided.

The equipment hood extends from the operator's compartment to the rear end of the locomotive. The forced Pyranol air-cooled transformer, located next to the operator's compartment, utilizes the full width and height of this section. Included, on the transformer are the tap switches that supply a variable voltage to the rectifier and traction motor, a pyranol pump to circulate the transformer coolant, and other switch gear necessary for the circuit operation. The 11,000-volt high-voltage bushing extends from the top of the transformer through the roof so that the 11,000 volt circuit is confined to the roof. Canopies extend over the outside walkways underneath the pantograph area to protect personnel from contact with the high voltage.

Located adjacent to the transformer switch gear is a high speed, air circuit breaker to limit the current on arc back. Protection is also provided for short circuit and ground faults occurring in the transformer and traction motor circuits. The auxiliaries have their own individual overload protection.

Twelve main circuit, power rectifier tubes with their firing circuit apparatus are located on the outside of the locomotive at this section in order to permit easy inspection and maintenance of the rectifier tubes and circuits.



Plan showing location of principal pieces of equipment.

1—main transformer
2—transformer switches
3—high speed breaker
4—rectifier tubes
5—rectifier temperature control
6—control compartment
7—air compressor
8—air brake equipment
9—relay cabinet
10—equipment blower
11—master controller
12—air brake controls
13—engineman's seat
14—helper and brakeman's seats

Four iron core current balancing reactors are located between the rectifier cubicles while the main smoothing reactor is located underneath the platform below the rectifier section, thus minimizing the undesirable magnetic effects of the reactor and helping to lower the center of gravity of the locomotive.

Also included with the rectifier compartment is a water pump and temperature regulating system necessary to maintain the temperature of the rectifier tubes within its operating values. A three-way regulating valve insures that the water temperature is closely controlled at approximately 43—50 deg C. The rectifier coolant is cooled by a water-to-air heat exchanger located in the equipment blower compartment. The blower is a large, two-stage radial type that draws air in from both sides of the locomotive at nearly roof level and blows it downward through the rectifier heat exchanger and into an air duct in the cab underframe. From here it is distributed to the transformer, reactors and traction motors.

Control Equipment

The majority of the control equipment is contained in two control sections, separated by an inside aisle and accessible from either the inside or outside of the locomotive. This permits the greatest amount of accessibility for inspection and maintenance of equipment.

The structure of the control and rectifier compartments provides support for the resistor compartments located on the roof. This arrangement allows the length of the interconnecting leads and bus bars to be kept to a minimum. It also keeps the heat dissipated from the resistors away from the control equipment and provides a neat, well-proportioned package.

The nose of the long end equipment hood houses the air compressor, governor, and control air reservoir. This compartment is accessible from either side and from the nose. The compressor is a Westinghouse Air Brake two-stage, motor-driven model with a rating of 224 cfm, at 140 psi at 725 rpm. It is equipped with suction unloading valves so that the compressor may be started unloaded and operated continuously instead of intermittent start and stop operation. This is important since the auxiliary motors are of the single-phase, induction type and starting every few minutes would be too severe a duty on this type of motor.

The batteries and air reservoirs are located underneath the platform. The battery has a rating of 114 amp-hr at an 8-hr rate, and contains 8 trays of 4 cells each. The locomotive control system is designed for 65 volts and can be operated from the batteries for a certain length of time. Placing the batteries outside of the equipment hoods is desirable from the standpoint of maintenance and ventilation.

Operating requirements dictate that the locomotives must be capable of being operated two, three or four units in multiple in either direction. Since they are classified as road-switcher locomotives, they must be capable of doing both types of service.

When these locomotives go into service, they will operate two in multiple the majority of the time. They will be expected to perform the same duties as the General Electric 6900-hp EL2B motor-generator locomotives that have been operating on the Virginian since 1948. With the addition of these 12 rectifier locomotives, the Virginian plans to retire 36, 30-year old electric units.

GN Ventilates Tunnel . . .

(continued from page 76)

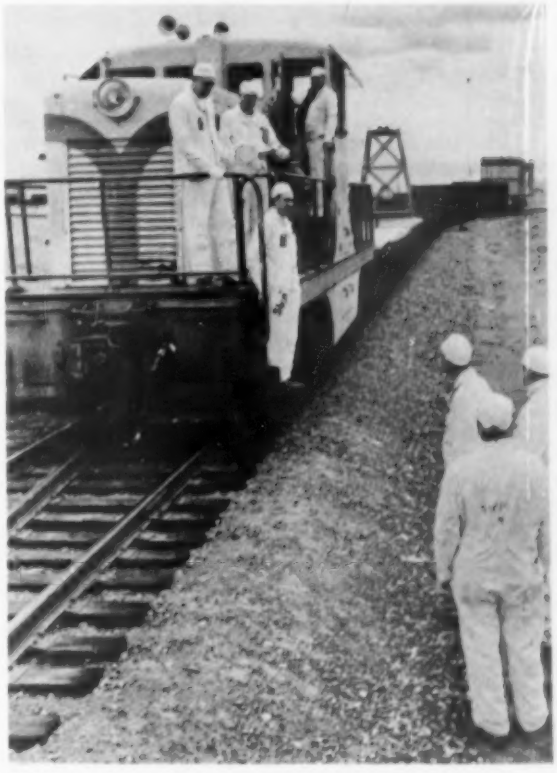
grade from 4 per cent to 2.2 per cent, and eliminated 2,322 deg of curvature.

The first step toward electrification in the Cascades was taken in 1909 when the tunnel was electrified to eliminate serious smoke and gas conditions which had developed with increased traffic, and to improve operating conditions for heavy freights through the tunnel.

This first electrified operation was a 3-phase, 6,600-volt system with two trolley wires, the rails being used as a third conductor. Locomotives were equipped with 3-phase induction motors and could be operated at 2 speeds—approximately 15 mph for passenger trains and light freights and 7½ mph for heavy freight trains.

Simultaneously with the opening of the new Cascade Tunnel in 1929, electrified operation was extended to Skykomish on the west and Wenatchee on the east. The tunnel, plus a major relocation of the line on the east slope, reduced curvature by 3,674 deg, lowered the summit elevation 502 ft, eliminated 19,332 ft of previous tunnels and 39,870 ft of snow sheds, and shortened the line 9 miles. Cost of the new, single-phase electrified operation, including 14 electric locomotive units, was approximately $6,000,000.

In addition to subsequent line improvements in the Cascades, the big tunnel was completely relaid with continuous pressure-welded rail in 1949.



RADIO-ACTIVE WASTE being transported to a burial ground at the government's Hanford, Wash. plutonium plant. Specially equipped and trained train crews are used for this purpose, and one crew is relieved by another when the timekeeper's records show that exposure to radio-activity is approaching the permissible limit.

RAILWAY LOCOMOTIVES AND CARS

PROBLEM PAGE . . .

WHERE THE TOUGH ONES ARE HANDLED

A new question this month. Remember that it pays you to share your ideas and experiences with our readers. Submit letters to the Problem Page Editor.

What maximum independent air brake pressure should be used on diesel locomotives in switching service? Does locomotive weight, builder, wheel size, type of switching service (hump, flat classification or transfer) or other factor make it necessary to use different pressure settings on different units? What setting is necessary if a unit is used in yard and road service?

CONTROLLED-CLEARANCE BEARINGS

Now that the Controlled-Clearance Journal Bearings are mandatory on freight cars, do they complicate repair track operations? What proportion of the total used are the A-1 size? The A-3 size? The A-5 size? Has it been your practice to reclaim journal bearings, and can it be done now?

BEARING DISTRIBUTION, *by H. T. Cover, assistant vice president-chief mechanical officer, Pennsylvania Railroad.* Our records of bearing consumption indicate that the A-1 size is in greater demand than the A-3 or A-5 sizes, as follows:

5½ x 10-in.		6x11-in.	
A-1	73.3 per cent	A-1	72.5 per cent
A-3	19.0 " "	A-3	17.3 " "
A-5	7.7 " "	A-5	10.2 " "

Our original experience is with the 5½ x 10-in. and the 6 x 11-in. size bearings, and we are now in the process of extending this to the 5 x 9-in. and 6½ x 12-in. bearings. We are, therefore, not in position to give any indications as to the consumption.

EXTRA PRECAUTIONS NEEDED, *by car department superintendent.* We do not find that use of Controlled-Clearance Journal Bearings complicates repair track operations to any serious extent. It is essential for the success of these bearings that extra precautions be taken to see that proper bearing is applied after gaging the journals.

While we have not been applying controlled-clearance bearings a sufficient length of time to arrive at firm figures for the breakdown as between the three bore diameters, we have set up a proportion as follows until we have experience to indicate a change:

A-1	70 per cent
A-3	18 " "
A-5	12 " "

We reclaim journal bearings by having them relined by the manufacturer and reclaim good second hand journal bearings by boring in True-Bore machines, three of which we have at one point. The latter bearings are used only on system cars.

FORCES BECOME ADEPT, *by J. P. Knox, superintendent car department, Frisco.* In the beginning we felt the use of Controlled-Clearance Journal Bearings would be rather complicated. However, since beginning their use, we have found our forces have become adept in handling the various sizes, and it has in no way hampered our repair track operations.

As to what part of the total used are the A-1 size, the A-3 size and the A-5 size, we are not at this time in a position to answer this question with any degree of accuracy. We feel it will take several months to develop this information. However, our original purchases of the new controlled-clearance bearings have been as follows:

A-1	50 per cent
A-3	30 " "
A-5	20 " "

We have never reclaimed journal bearings. However, we do not see why it cannot be done if proper facilities are available.

QUIT RECLAIMING BEARINGS, *by a car department superintendent.* On our line, the use of different sized journal bearings does not create any problem, as we have been using broached brasses on our equipment since 1936. As to the proportion of total used, roughly speaking we use about 60 per cent of the A-3 size, and about 20 per cent of the A-1 and A-5 sizes.

Before we started using the Controlled-Clearance Bearings, we used to reclaim quite a number of bearings and use them on our own equipment. Since the Controlled-Clearance Bearings have come into the picture we have discontinued the practice of reclaiming bearings. After checking the cost of handling and reclaiming bearings, it was felt that there is very little saving involved.

UNFORTUNATE TIMING, *by superintendent of car department.* While we do believe that some advantages will be obtained [from Controlled-Clearance Bearings], we are far more concerned with the benefits that will be derived from various types of lubricators. We believe that it is unfortunate that the Controlled-Clearance Bearing and the lubricators are making their appearance at the same time. If an improvement in hot boxes results, it will be hard to give credit to the proper source of the improvement.

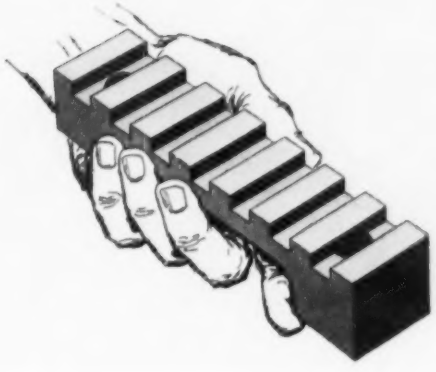
SPECIFIED INSIDE DIAMETERS OF AAR STANDARD JOURNAL BEARINGS (IN.)

Journal Size	A-1	A-3	A-5
5 x 9	5.015	4.890	4.765
5½ x 10	5.515	5.390	5.265
6 x 11	6.015	5.890	5.765
6½ x 12	6.515	6.390	6.265

How R-S JOURNAL STOPS will further

Reduce Solid Bearing Operating Costs

and pay for themselves in less than 3 years!



Tests have proved that this new device will greatly improve bearing performance and journal lubrication, will at least double bearing life, reduce wheel flange wear and make other significant savings in freight car operation.

STABILIZE the solid bearing assembly and you approach the maximum in bearing performance. You do just that with R-S Journal Stops. Best of all, they pay for themselves in less than 3 years. Here's how:

First, you reduce routine yard servicing and oiling requirements. Packing seldom needs adjustment, and you don't need oil so often either. (Other lubricators, pad or mechanical, will benefit, too). You cut car oilers' time in half, and inspectors' time by as much as 25%. When enough cars are Journal Stop equipped that could mean savings close to $18.00 per car per year.*

Second, all indications point to 3-year periods between periodic attention as required by Rule 66. That would cut current costs in half — save as much as $6.00 per car per year.

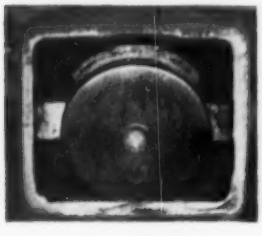
Third, and conservatively, you'll reduce road repair costs to a third of what they now are — possibly a great deal more. That means minimum savings of $6.00 per car per year.

Fourth, you'll cut bearing consumption in half — use less than 1½ bearings per car per year. In annual savings that will mean about $4.00 per car.

The above four items alone represent potential annual savings of $34.00 per car. Add to these the tremendous savings due to reduced wheel flange wear and a 3-year recovery estimate is probably conservative.

One private car company whose total savings are determined largely by billings that don't cover servicing costs, has already estimated recovery of total installation costs in less than 3 years. Operating roads will save even more. Write us today for full information. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

**These and other estimated savings are based on unbiased studies of AAR solid journal bearing operating costs.*



Unretouched photo of the RS Journal Stop installation with conventional waste packing. Other lubricators are similarly "contained."

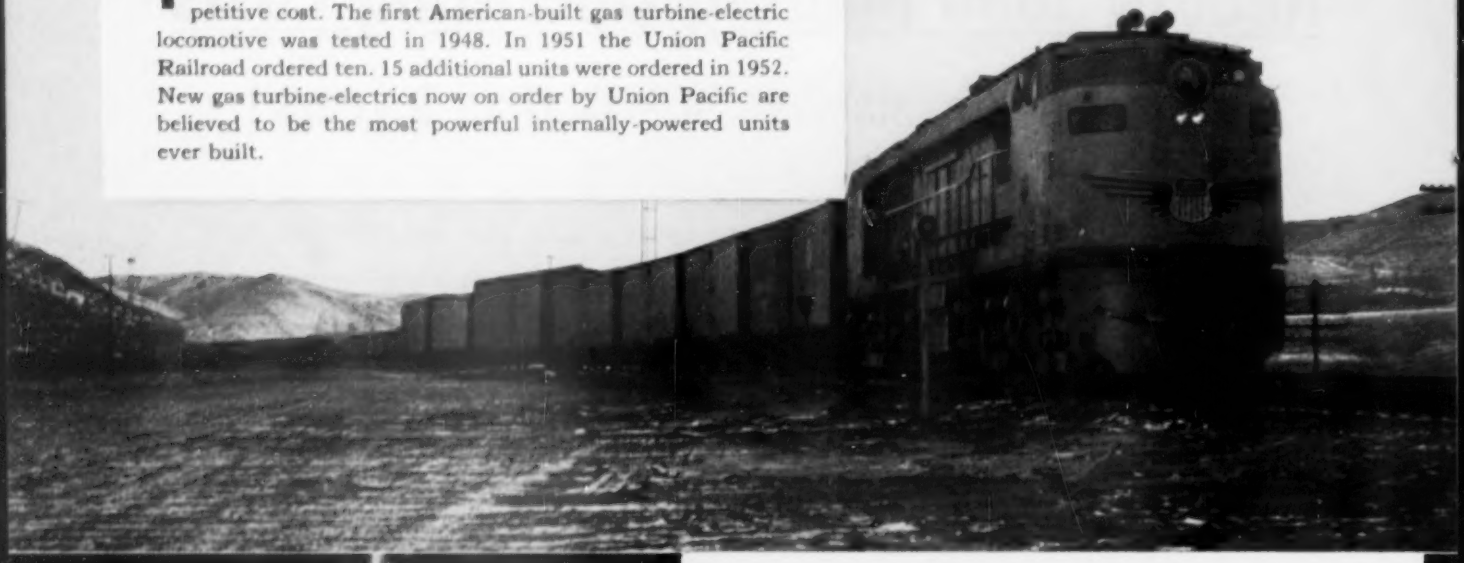
MAGNUS

Solid Bearings

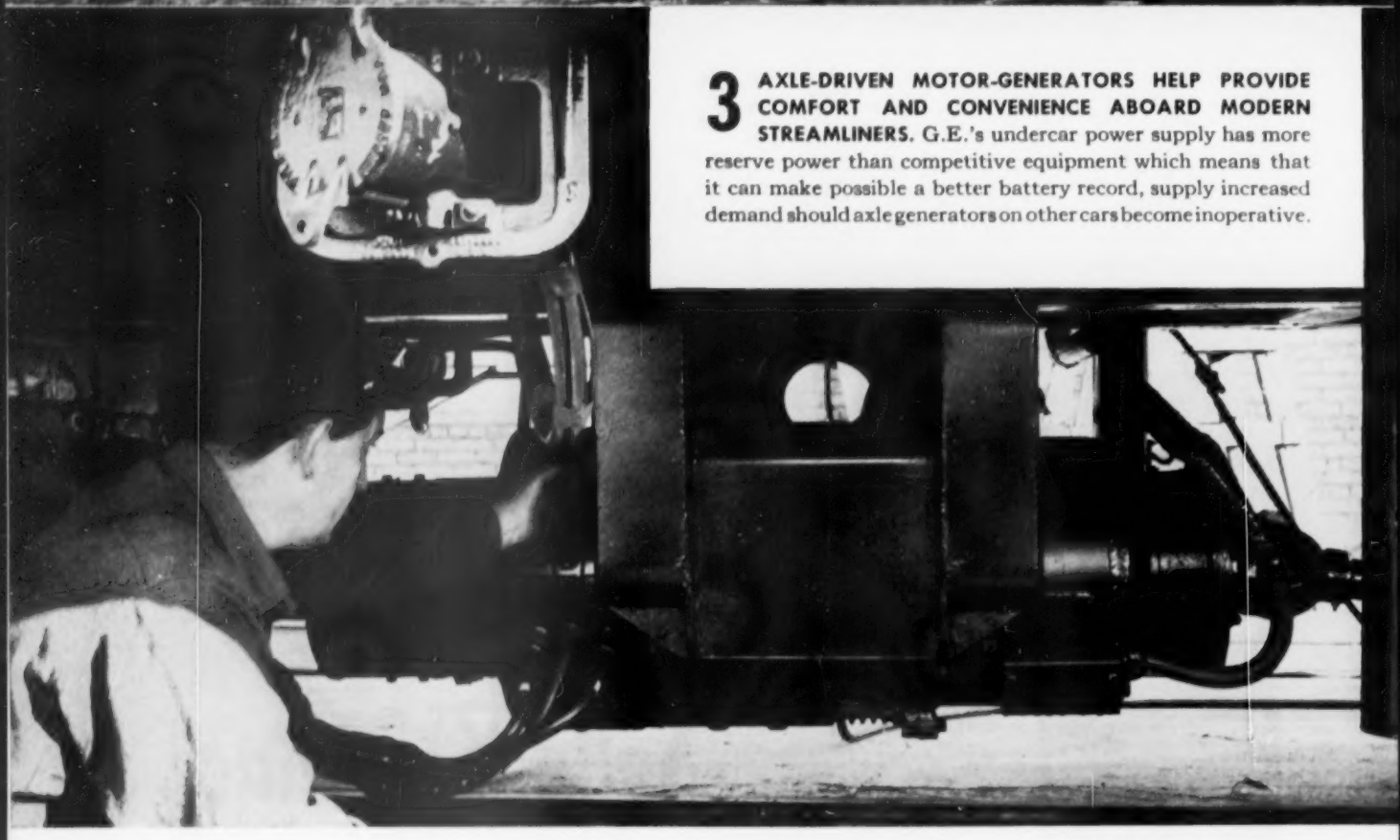
MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

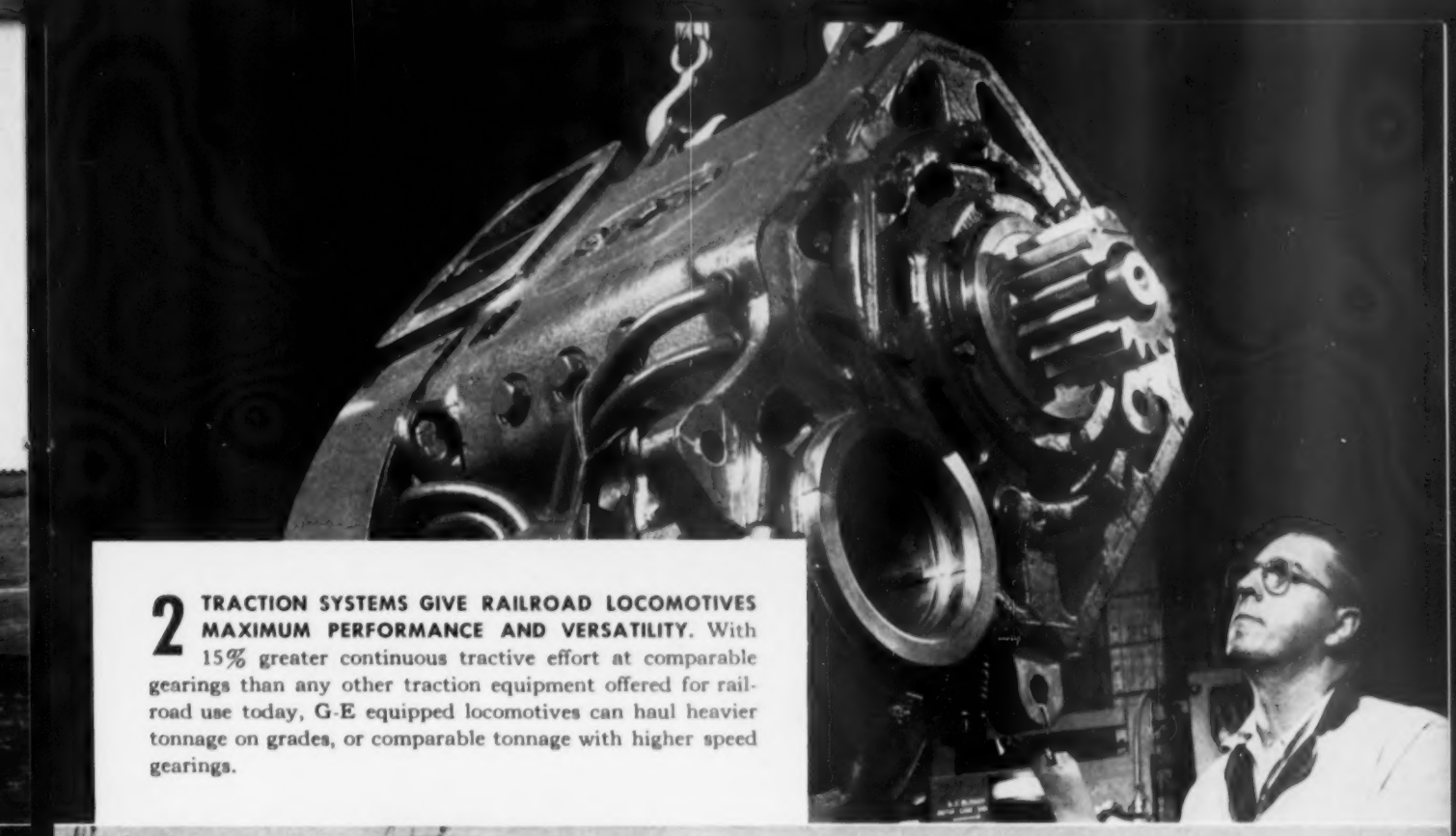
1 GAS TURBINE-ELECTRICS BRING NEW POWER TO THE RAILS. They haul long freight trains faster, and at competitive cost. The first American-built gas turbine-electric locomotive was tested in 1948. In 1951 the Union Pacific Railroad ordered ten. 15 additional units were ordered in 1952. New gas turbine-electrics now on order by Union Pacific are believed to be the most powerful internally-powered units ever built.



3 AXLE-DRIVEN MOTOR-GENERATORS HELP PROVIDE COMFORT AND CONVENIENCE ABOARD MODERN STREAMLINERS. G.E.'s undercar power supply has more reserve power than competitive equipment which means that it can make possible a better battery record, supply increased demand should axle generators on other cars become inoperative.



Four Examples of How General Railroad Progress with Electrical



2 TRACTION SYSTEMS GIVE RAILROAD LOCOMOTIVES MAXIMUM PERFORMANCE AND VERSATILITY. With 15% greater continuous tractive effort at comparable gearings than any other traction equipment offered for railroad use today, G-E equipped locomotives can haul heavier tonnage on grades, or comparable tonnage with higher speed gearings.

4 NEW RECTIFIER LOCOMOTIVES PROVIDE SPEED AND POWER FOR KEEPING FAST FREIGHT AND PASSENGER SCHEDULES. In 1895, G.E. put the first mainline electric in service on a major railroad. Since that time, there has been continued progress in railroad electrification. Today this progress is exemplified by G.E.'s rectifier-electric locomotives now operating on the New Haven Railroad.

Electric Promotes Pioneering

For more information, contact your G-E Apparatus Sales representative, or write Section 135-7A, General Electric Company, Locomotive and Car Equipment Department, Erie, Pa.

Progress Is Our Most Important Product

GENERAL ELECTRIC

QUESTIONS and ANSWERS

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Miscellaneous Operating Instructions.
Manual 2310 Page 217

Changing Operating Ends,
Locomotive Consisting of 2 A Units.

G527-Q—In changing from one operating end to the other end, what should be done if the locomotive is equipped with electro-pneumatic brakes and that brake has been in use?
A—Change the brake selector on the automatic brake vale to AUTO and open the electro-pneumatic brake switch.

G528-Q—What should be done with the reverse lever?
A—It should be removed.

G529-Q—What should follow?
A—With safety control foot pedal depressed, release independent air brake by placing independent brake valve handle in release position.

G530-Q—What action should follow?
A—Make full service automatic brake reduction, close brake pipe cut out cock and release safety control foot pedal.

G531-Q—What should be done with the rotair valve?
A—Move the rotair valve to the proper *LAP* position.

G532-Q—What should follow?
A—Move the automatic brake valve handle to the Running position and remove the handle.

G533-Q—What other action should be taken with the air brake equipment?
A—Remove the independent brake valve handle in the Release position.

G534-Q—Before proceeding to cab at opposite end what finally should be done?
A—Open all switches in control push button box and lock switches in *OFF* position.

G535-Q—What should first be done at unit on opposite end?
A—Check *P C* switch and reset if necessary. Open switch lock on control push button switch box, close control and fuel pump switches.

Manual 2310 Page 218

G536-Q—What should follow?
A—Insert reverse lever, apply both brake valve handles and place independent brake valve handle in full application position.

G537-Q—What next should be done?
A—Move rotair valve to the proper operating position. Open brake pipe cut out cock (double heading cock) slowly, pausing 5 to 10 seconds in *MID* position.

G538-Q—When ready to move the locomotive, what should be done?
A—Depress safety control foot pedal or automatic brake valve handle and move the independent brake valve to release position.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F470-Q—Is maximum load meter amperage in the red zone permissible?
A—Yes, on starting and acceleration, provided the pointer steadily returns to green (continuous) zone.

F471-Q—If power is left on to keep slack out when applying brakes for a slow down, what must be done?
A—Use reduced throttle and keep independent brake fully released while applying train brakes.

F472-Q—What must be the position of the throttle when locomotive stops?
A—Throttle must be in Idle when locomotive stops.

F473-Q—Is continued application of power to traction motors when locomotive is stationary, harmful?
A—Yes, if this is done even for a short time, serious damage will result.

Visual Inspection During Stops

F474-Q—What should be done if time permits during stops?
A—Make visual inspection of under part of locomotive to detect any signs of trouble.

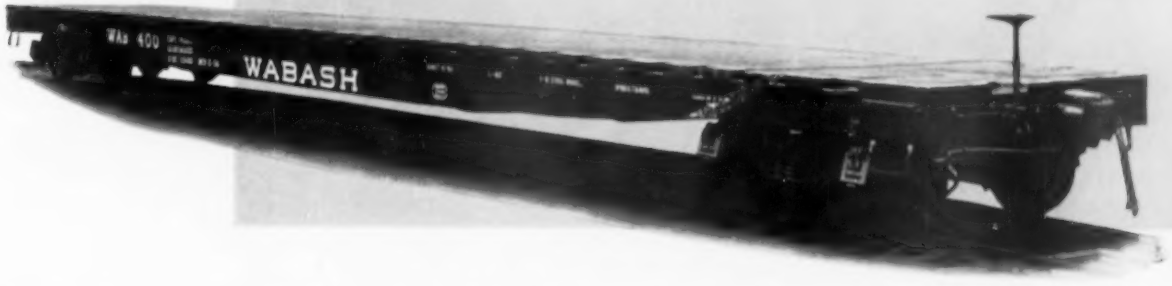
F475-Q—What should be watched for?
A—Hot journals, hot motor axle bearings and hot armature bearings.

F476-Q—What other items should be checked?
A—Note any fuel or lube oil, water or steam leaks. Check also for loose or dragging parts.

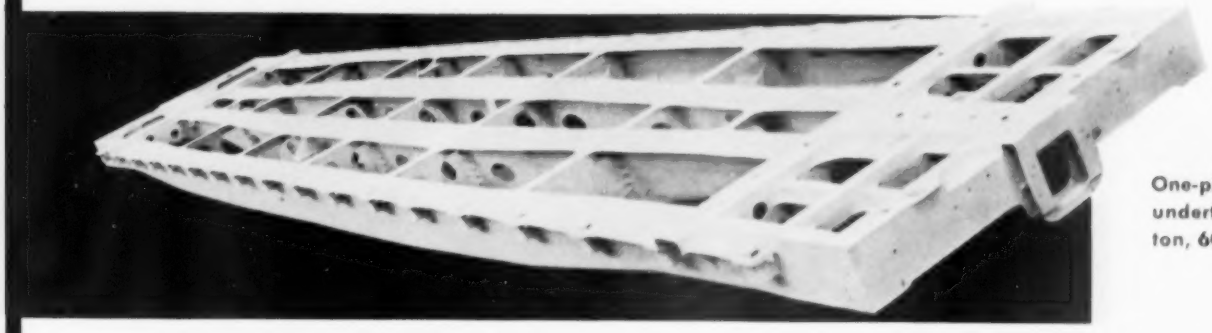
F477-Q—What precaution must be observed when reversing?
A—Bring locomotive to a dead stop before moving reverse handle for opposite locomotive movement.

F478-Q—Why is this precaution necessary?
A—Serious damage may result to traction motors if power is applied in reverse direction.

60′ 70-ton flat cars with one-piece underframes.



the demand for 60′ flat cars is increasing . . .



One-piece cast steel underframe for 70-ton, 60′ flat car.

and *this* is the most modern underframe design!

Commonwealth Cast Steel Underframes are *maintenance free*

More and more shippers are requesting 60′ long flat cars! Progressive railroads are meeting the demand by building these cars equipped with Commonwealth One-Piece Underframes specially designed with *extra strength* for flat cars with or without end bulkheads.

The one-piece cast steel design permits more economical distribution of metal for uniform strength throughout, and eliminates many separate parts. End bulkheads may be quickly applied at minimum cost. Corrosion is no problem . . . maximum availability is assured.

Year after year, on many leading railroads, thousands of flat cars equipped with cast steel underframes are proving their exceptionally long, maintenance-free life. Invest in Commonwealth underframes!

GENERAL STEEL CASTINGS

GEARED TO PROGRESS P R I MEMBER

GRANITE CITY, ILL. EDDYSTONE, PA.

These powerful heavyweights—built for toughest railroad duty—pack the extra wallop it takes to crank those big diesels over *fast!* Full quarter-inch-thick positive plates (more grid metal than you'll find in any other heavy-duty battery) provide power-plus. Exclusive C&D *Slyter-Clad*® construction cuts down on wasted sediment space . . . uses the room for extra long plates.

C & D Diesel Starting Batteries mean:

1. High sustained voltage during cranking
2. Reduced maintenance requirements
3. Reduced connection loss

FOR COMPLETE DETAILS WRITE FOR BULLETIN DL-576.

PASSENGERS STAY COMFORTABLE with C&D Car Lighting and Air Conditioning Batteries

C & D MEANS:

1. Lowest annual cost
2. Sustained high voltage for maximum time
3. Reduced connection loss

For complete details, write for Bulletin AC-546.

C&D BATTERIES, INC.
of Conshohocken, Pa.

50th

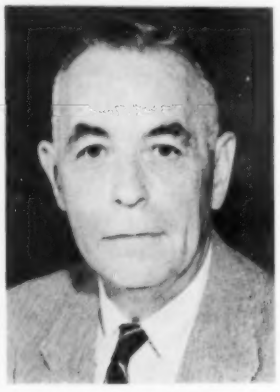
INDUSTRIAL BATTERIES SINCE 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

SUPPLY TRADE NOTES

(Continued from page 24)

tion Products Sales department: *J. D. Kennedy*, formerly associated with General Electric, has been appointed district manager, in charge of southeastern territory, with headquarters at Atlanta, Ga. *Philip R. Lochner* has been appointed district manager at New York. *J. K. Sparrow*, district manager at Louisville, Ky., has been transferred to Philadelphia as district manager there. *T. E. Zick*, sales representative, has been transferred from Detroit to Cleveland.



E. F. Sheehan

BALDWIN-LIMA-HAMILTON CORPORATION.—As part of a general consolidation program at the Eddystone Division of Baldwin-Lima-Hamilton Corporation, *Edgar F. Sheehan* has been appointed sales manager for all transportation products, in charge of locomotives, dump cars, renewal parts and transportation field service. Mr. Sheehan was previously manager of renewal parts.

■

OGONTZ CONTROLS COMPANY. — *Bruce C. Gunnell* has been appointed railroad representative in the southeastern states.

■

ELECTRIC STORAGE BATTERY COMPANY.—*Thomas J. Benner*, manager of chemical, physical and mechanical testing laboratories, Exide Industrial Division, has retired.

■

MAGNUS METAL CORPORATION. — *Joseph E. Brown*, consultant and former vice-president sales, retired September 1.

■

SPRING PACKING CORPORATION.—The *Stan H. Haigh Company* of St. Paul has been appointed representative of Spring Packing in the Twin Cities area.

Obituary

Leonard F. Munson, retired general superintendent of shops of the Pullman Company, died August 2 at Bryson City, N.C.

■

John Thomas, former vice-president-engineering of Alco Products, Inc., died suddenly at Miami, Fla., on August 31.

USG® BRUSH GRADES AY 32 AND 2306

service proved for diesel main generators

USG Brush Grades AY 32 and 2306 have proved their high performance in main generators on Diesel-electric locomotives in every type of service. Because of longer life USG Brushes actually reduce down time due to generator overhaul. Brush replacement as well as commutator wear is held to a minimum. A performance test on your equipment will prove that USG Brushes will give you superior commutation and longer service life. Only USG Brushes have Statite® . . . the permanent shunt connection that cannot be pulled out or jarred loose. Statite retains its original low millivolt shunt drop. Now's the time to try USG Brush Grades AY 32 and 2306 with Statite connections that have never failed in millions of miles of railroad service! Why not order today?

Send for the latest USG Brush Catalog B-56 and the new USG Brush Grade List, both are excellent for designing or for specific applications.

223

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

CHEAP CLEANERS COST MORE!

Lix Diesel Cleaners cost a little more initially, but are less expensive in the "long run."

Here's a cost comparison of 2 cleaners for a period of 6 months each. Note how much less Lix Diesel Klean Heavy costs over the same period of time.

*Lix added to replace drag out	COST PER GALLON	COST TO CHARGE TANK	UPKEEP COST
CHEAP CLEANER	$1.95	$195.00	$1170.00
LIX DIESEL KLEAN HEAVY	2.53	253.00	506.00
Saved by using LIX . . .			$ 664.00

This "long run" saving is one of the reasons more and more Railroads are relying on Lix. Lix Cleaners are compounded to give longer life without frequent new charges, thereby greatly reducing the operating costs.

Lix representatives, all specialists in the Diesel cleaning field, will be glad to demonstrate in your shop, how you can get better cleaning results at less dollar cost.

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix PRODUCTS OF RESEARCH CORPORATION (OF MISSOURI)

716 EAST 85TH STREET, Dept. RL-10
KANSAS CITY, MISSOURI

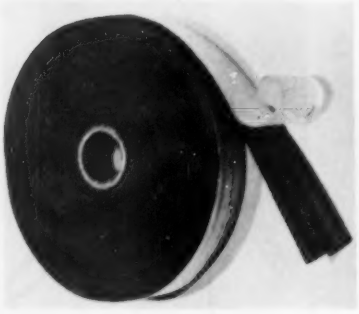
"Leadership in Industrial Cleaning"

EQUIPMENT

(Continued from page 14)

where in the yard or shop on its own power in a distance of 60 yd. No engine for dragging or pushing is necessary.

Model DRS-1 is designed to fit equalizer truck type engines; model DYS-2 can be used on yard switcher truck type engines; model DPFG-3 is designed for passenger and freight type engines where brake lever and two hangers are applicable, and model DGE-4 is designed for all types of General Electric engines. *G & G Tool & Mfg. Co., Dept. RLC, 424 Granby street, Hartford, Conn.*



Pressure-Sensitive Felt Tape

This is a high-grade felt tape, one side of which is coated with an extra powerful pressure sensitive adhesive applied in "track form." The tape, Spring-Felt No. 124XN-T, which can be applied with finger pressure, is said to have many uses in the heating, air-conditioning, electrical, transportation, electronic, construction, and other related fields. It seals against dust, dirt, wind, fumes and moisture; eliminates squeaks and rattles, and has great cushioning power. It is supplied in roll form and in die-cut and segmented form. *Dept. PR, Spring Packing Corporation, Dept RLC, 332 South Michigan avenue, Chicago 4.*

Wire Rope Service Records

This fact-finding system for wire rope data is designed to increase wire rope operating efficiency and help reduce supply and maintenance costs. It furnishes comparative data on wire rope types, construction and make.

Basic element of the system is a sticker which can be applied directly to the wire-rope using equipment by means of a pressure-sensitive adhesive. When a new rope is installed, the Service-Score Sticker is applied in a convenient location, the equipment number filled in, make, and name of the line, rope size, type, construction, length, brand and date or engine hours.

Separate stickers are used for each line

"PHE" COMPRESSOR

serves growing plant-air load at Rotary Electric Steel Co.

WHEN the Rotary Electric Steel Company of Detroit, Mich., increased plant capacity, the existing plant-air supply was also increased by adding the Ingersoll-Rand 100-hp PHE compressor shown above. The extreme simplicity of this installation is obvious at a glance.

The main air supply consists of two Ingersoll-Rand duplex, electric-driven compressors totaling 500 hp. After serving for 40 years they are still giving entirely satisfactory performance.

The new PHE unit is a compact, packaged-type, two-stage air compressor with built-in motor and efficient intercooler. It was shipped completely assembled, ready to run. Installation was simply a matter of mounting the unit on a small foundation and connecting the air, water and power lines. And like many other modern Ingersoll-Rand compressors the PHE has full-floating aluminum bearings that need no adjustments.

Ask your I-R representative for full details on the smooth-running PHE compressor. Its inherent longevity and low maintenance requirements mean big savings in air power costs.

Only I-R Compressors have CHANNEL VALVES

Known the world over for High Efficiency • Quiet Operation
Durability • Air-Cushioned Action • Corrosion-Resistance
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COMPRESSORS • ROCK DRILLS • AIR & ELECTRIC TOOLS
GAS & DIESEL ENGINES • TURBO-BLOWERS • PUMPS

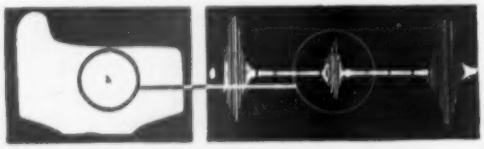
REFLECTOSCOPE TEST BULLETIN

ULTRASONIC WHEEL INSPECTION
Finds Flaws Before They Become Failures

Diesel, passenger and steel freight car wheels are being accurately, quickly and economically tested for internal defects with the Sperry Ultrasonic Reflectoscope. With today's faster trains and heavier loads, maintenance departments need, more than ever, such an efficient, reliable method of wheel inspection.

While ultrasonic testing at point of manufacture will assure that new wheels are free from defect at delivery, there are still millions of wheels in use – in every category of service life – that never have been tested. Periodic testing of all wheels is your assurance of fewer failures.

How Reflectoscope Works



A narrow beam of high-frequency sound penetrates the test piece or area and is reflected from any defect in its path – immediately and accurately picturing the defect on the Reflectoscope cathode ray tube. The Reflectoscope picture above shows a defect in a wheel rim. The cross section of the actual rim shows the defect – just where the Reflectoscope indicated it would be.

Locating internal flaws before they cause wheel failures is positive insurance against costly derailments . . . Reflectoscope inspection is the most accurate, economical method of locating wheel defects. Ask your Sperry Sales Engineer to show you how Reflectoscope works and how it can fit into your maintenance schedule. For more detailed information return the coupon below.

SPERRY RAIL SERVICE
Division of Sperry Products, Inc.
Danbury, Connecticut

Send details of ultrasonic inspection for railroad equipment.

Name _____ Title _____

Address _____

City _____ Zone _____ State _____

used on the machine. When the rope is removed, the date is noted in the last space and the sticker used as part of the permanent office record. *Leschen Wire Rope Division, H. K. Porter Company, Dept. RLC, 2727 Hamilton avenue, St. Louis 12.*

Drill Press

Utilizing a heavy-duty electro-magnetic base, this power drill press can be affixed directly to the surface of the job. Regardless of working position, the burden of drill weight is spared the operator.

The power tool, the Portomag, includes a 3-way power control switch that enables the operator to vary the holding power in the electro magnetic base. This switch allows for a reduction in power that is sufficient to hold the weight of the unit against work surfaces, yet allows for positioning to the center punch mark. In full power position, the unit is securely held in position for drilling operations. For removal from the work, a demagnetizing switch is employed. The unit can also be equipped with an optional reversing switch for tapping operations. *Portomag, Inc., Dept. RLC, 1511 E. Nine Mile road, Ferndale 20, Mich.*

36-Inch Lapping Machine

A 36-in. machine has been added to the John Crane line of Lapmaster lapping machines which range from 12 to 72 in. in lap plate diameter. Inside diameter of

ENGINEERED FILTRATION
While your Diesel engines are "grinding out the miles", let's be sure that dirt in lubricating oil isn't doing a grinding job on your dollars!
Grit, you can't even see, can develop enough abrasive wear to cripple a locomotive engine. And, it doesn't take long!
Constant, unfailing oil filtration . . . WIX ENGINEERED FILTRATION . . . is the practical, dollar-saving answer to the problem of removing contaminants from fuel and lube oil.
Keep abrasive foreign matter and tarry sludge out of your Diesel engines with WIX OIL FILTER CARTRIDGES. They are Engineered to give greater protection and longer service at a price ridiculously low compared to the money they save!
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BE SURE YOU'RE ON THE RIGHT TRACK
ALWAYS SPECIFY

the conditioning rings is 14½ in., thus permitting handling parts up to that size. Capacity-wise, the machine will take over twice as many 1-in. parts as the 24 in. model. A roller-bar attachment provides shelf space for placing pressure plates or fixtures.

The drain hole on the 36-in. Lapmaster is on the side, and a wiper blade fastened to the underside of the base table brings all spent compound into the drain. A rubber hose, fastened to the drain plug, allows a container to be placed out of the way under the machine.

This line of Lapmaster lapping machines is capable of generating surface flatness to less than one light band. *Crane Packing Company, Dept. RLC, 6400 Oakton street, Morton Grove, Ill.*

Flat Type Motor

These units, designed to meet specifications for NEMA design B motors, were developed for use in operating turret lathes, punch presses, milling machines, pumps, oil burners and similar applications where there is a minimum of space. In totally enclosed fan-cooled or totally enclosed non-ventilated designs, they are said to provide maximum horsepower with minimum size.

The flat-type units weigh less than standard motors, are of radial design and are constructed like conventional squirrel cage motors. They have no complicated air-gap adjustments nor precision alignments.

They operate at 208, 220/240 or 550 volts, 2 or 3 phase, 60 cycle, continuous or intermittent duty, rating from ⅛ to 7½ hp. Special voltage motors are also available. *Diehl Manufacturing Co., Finderne Plant, Dept. RLC, Somerville, N.J.*

Pressure Reducing Valve

These air-loaded, pressure reducing valves, Class GPK, designed with only two moving parts, a metal diaphragm with full valve travel and a hardened stainless steel main valve that seats on a renewable stellited seat ring, are for steam heat and process steam applications.

The valve has an air loader that replaces the conventional loading spring and produces a constant loading force on the diaphragm. It is available in cast iron in sizes from ½ to 2 in. with screwed end connections. Inlet pressure range is 0-250 psi, 450 deg F. *Leslie Co., Dept. RLC, Lyndhurst, N.J.*

Insulation Resistance Testing Instruments

These Vibrostat devices, introduced originally for measurement of insulation resistance only, have had their flexibility increased by addition of ohm ranges and ac and dc voltage ranges on most of the models. A battery-operated, vibrator type power supply furnishes a portable source of high voltage dc.

Its case is of all-steel welded construction, redesigned for greater handling ease. Rubber feet are placed so that the instrument can be used in the horizontal or vertical position. An inner hinged lid in the cover swings open to give storage space for test leads, manual, record cards, etc. All components in the metering circuit are in a dust-tight moisture proof enclosure within the case. Other features include all measurements by push-button only and automatic discharge circuit to short circuit the device under test when the push button is released. *Associated Research, Inc., Dept. RLC, 3758 West Belmont avenue, Chicago 18.*

Brush for Washing Railway Cars

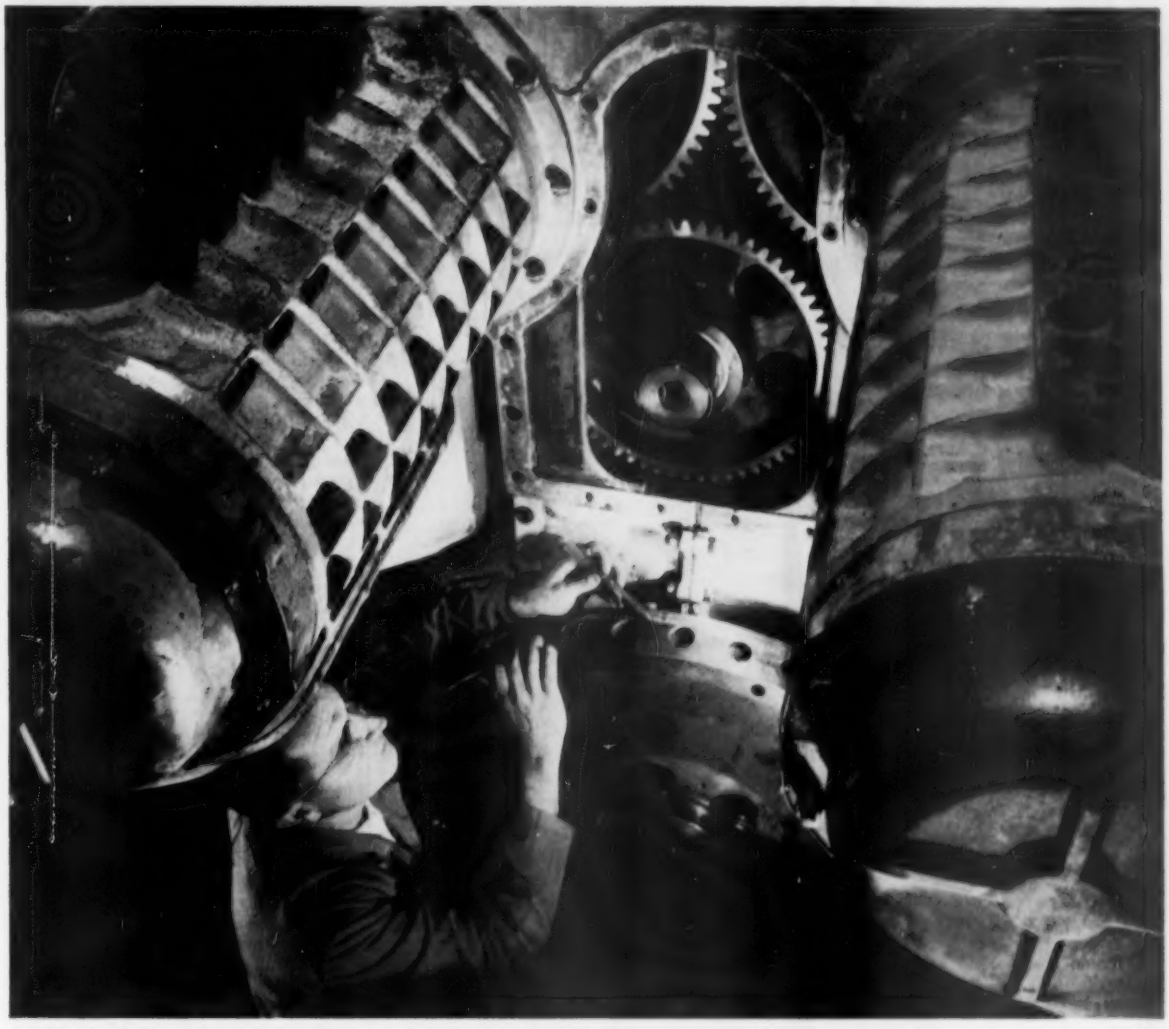
An intermediate-size fountain brush, with bristles of 100% du Pont Tynex nylon, can be used on paint or enamel surfaces. Bristles will not mat or scratch and can be used in boiling water.

The head of the brush, Model LS9, is 8 in. by 3 in. It weighs 1 lb 10 oz complete and is slightly more maneuverable than larger brushes. No extra equipment is needed. It has a 4-ft corrosion-resistant

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2¼ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ¼° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion

• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

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STANDARD OIL COMPANY OF TEXAS, El Paso

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F.O.-128

(low toxicity — high flash)

FOR ALL DIESEL

ELECTRICAL EQUIPMENT

FINE ORGANICS

SAFE-TEE® SOLVENTS

F. O. - 128 does away with carbon tetrachloride and all other cleaners that may be a health hazard to personnel.

F. O. — 128 increases cleaning and degreasing efficiency — does away with excessive maintenance costs, motor failures and wasted man hours.

- zero residue on drying
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- non-corrosive
- will not produce dermatitis

These unusual characteristics of F. O. - 128 makes it ideal for cleaning all types of Diesel, electrical equipment.

Check into the safety and effectiveness of F. O. - 128. Write today for details.

Now being used by an everincreasing number of railroads from coast to coast.

Also Available —
F. O. - 102 and F. O. - 162— Carbon Removers
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Our representative will be glad to call upon request. Write to Det.

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FINE ORGANICS, Inc.

211 East 19th St. · New York 3, N. Y.

aluminum pipe for connection with water hose. Water is delivered through the handle, through perforations in the brush, and through the bristles to the surface being washed. Scrubbing, washing, and rinsing are done in one operation.

Four bolts hold the brush element securely to the head. Both are of cast aluminum. The brush element is replaceable or refillable. The head is surrounded by a rubber bumper. Bristles are 2⅝ in. long. The brush can also be had with bristles of 50% Tynex and 50% horsehair. *K. C. Fountain Brush Company, Dept. RLC, 3714 Main street, Kansas City, Mo.*

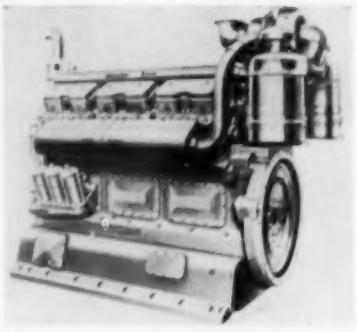
All-Steel Battery Trays

These trays conform to dimensions and practices recently adopted by the Industrial Truck Association. The tray cover is of heavy gage steel. Batteries may be installed back-to-back without interfering with the opening of the covers. Two sets of holes in the ends permit front or back cover hinging. Hinge pins are hex-head cap screws, secured in position with lock washers. Front and back edges are rounded. Built-in stops hold the cover open at a maximum of about 115 deg, and a spring steel clip holds the cover securely when closed.

The trays are available for 64 models of Exide-Ironclad and Exide-Powerclad motive-power batteries—for 12-, 18- and 24-volt Exide hand truck batteries, including types TH, TLM, MEX and MEH Exide-Ironclads and types TLF, THF and MEF Exide-Powerclads. *Exide Industrial Division, Electric Storage Battery Company, Dept. RLC, 42 South 15th street, Philadelphia 2.*

V-Type Engines

These 8-cylinder D375 and 12-cylinder D397 engines, which are capable of producing up to 650 hp, are of 4-cycle design. They are available in turbocharged, roots



blown, naturally aspirated and spark ignited versions.

Principal differences between the new engines and former models are in the cylinder heads, exhaust manifolds, method of supercharging, and in the case of the spark-ignited engines, the fuel used and the method of igniting it. Superchargers enable the engines to produce increased power with less fuel by using the energy of exhaust gases which would otherwise be wasted.

Exhaust manifolds are offered in dry, shielded and wet versions to enable users to adjust the engines for specific needs. These manifolds utilize heavy layers of fiber glass, encased in steel, to keep heat out of the engine room.

The D397 and D375 spark-ignited engines produce 400 and 276 hp, respectively, using natural gas as a fuel. They feature a 10 to 1 compression ratio, a low-tension magneto

WANTED

Technically trained man, 26-35 years, with mechanical or electrical degree, having at least five years' railroad experience in connection with the operation and maintenance of mechanical and electrical equipment of cars and locomotives. The ability to prepare technical reports and articles is a necessity, and the man selected will be given an opportunity which will pay him a good salary while being trained. The job requires traveling in the western United States, with headquarters in Chicago. If you are interested, tell us about yourself and your experience. Your reply will be held confidential. Address: *Box 750, Railway Locomotives and Cars, 30 Church street, New York 7.*

WANTED

Mechanical Engineer with experience in power plants, heating, ventilating, air conditioning, piping. Electrical knowledge helpful. Headquarters Denver. Write qualifications to Denver & Rio Grande Western Railroad Company, Personnel Office, Rio Grande Building, Denver, Colorado.

SPECIFY...PYLE-NATIONAL

Type WWPCJ
16, 21, 27-pole
Composite rubber-metal
Jumper

TRAINLINE PLUGS AND JUMPERS

FOR *LONGER* SERVICE LIFE . . . *LOWER* MAINTENANCE COST

Pyle-National's *composite*, rubber-metal design combines *all* the desirable features of a one-piece jumper with the distinct advantages of the *lighter weight, added strength* and the *renewability of every component part* made possible by the use of an aluminum alloy plug housing.

Watertight, unaffected by exposure to oil and extremes of temperature, Pyle composite jumpers have a service life expectancy far greater than a specific guarantee. It should never be necessary to replace the entire assembly, for when signs of wear occur, the plug housing is easily opened for routine inspection, repair, or replacement of any part.

Naturally, the Pyle-National Company will support the claims made for its product and guarantees all jumpers for workmanship and materials . . . as it has throughout its 57 years of manufacturing electrical equipment for Railroads.

DIESEL CONTROL CIRCUITS

Pyle jumpers for diesel control circuits have many outstanding features:

- Highly flexible, fabric-reinforced rubber conduit contains individually renewable wires. All pull is confined to housing and conduit, none on conductors or contacts.
- Provision for a firm hand grip on plug housing.
- 15% lighter than one-piece jumper assemblies.
- Removable, resilient rubber front insulation is shock-absorbing and will not become out-of-round. Number of poles and date of manufacture are clearly shown for quick identification.

RUBBER CONDUIT—CONVERSION KITS

Pyle metal head jumpers now in service using multi-conductor cable can be modernized by replacing the cable with rubber conduit and individually renewable jumper conductors.

OTHER TRAINLINE JUMPERS

with individually renewable parts and jumper conductors:

ELECTRO-PNEUMATIC BRAKE CIRCUITS—TYPE WVPJ
6-pole, A.A.R. standard . . . metal plug heads and rubber conduit.

COMMUNICATION AND ENTERTAINMENT CIRCUITS—TYPE CVPJ
14-pole, A.A.R. standard . . . metal plug heads and rubber conduit.

TRAIN LIGHTING AND DYNAMIC BRAKING CIRCUITS—TYPE TLPJ
2- and 3-pole, A.A.R. standard . . . rubber plug heads and rubber cable.

TYPE WVPJ

TYPE CVPJ

TYPE TLPJ

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SINCE 1897

LOCOMOTIVE HEADLIGHTS • GYRALITES • TURBO-GENERATORS • FLOODLIGHTS • CONDUIT FITTINGS • MULTI-VENT

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

1. LOCOMOTIVE CRANES. 14-page illustrated booklet describes the car body, the power, cast-steel machinery base, deck mechanism and machinery arrangement, and operator's station on Ohio air-controlled locomotive cranes. Includes also free lift capacities tables and clearance diagram. (Write: *Ohio Locomotive Crane Company*, Dept. RLC, Bucyrus, Ohio.)

2. GAGE GLASS CLEANING ROD. Data Unit (No. 293) gives details and features of newly developed rod for cleaning inside of gage glasses. Includes engineering drawing. (Write: *Jerguson Gage & Valve Co.*, Dept. RLC, 80 Fellsway, Somerville 45, Mass.

3. HOSE CLAMPS. Condensed catalog (F-279-R2) illustrates and describes hose clamps, locking tools, and fittings, also a Clamp-Master Kit. (Write: *Punch-Lok Company*, Dept. RLC, 321 North Justine street, Chicago 7.)

4. TANK FITTINGS. Bulletin describes manhole and manhole fittings for use on storage tanks containing hazardous liquids, either above or underground. (Write: *Colorado Fuel & Iron Corp.*, Dept. RLC, 575 Madison avenue, New York 22.)

5. NAILABLE STEEL FLOORING. 10-page booklet tells how Nailable Steel flooring in freight cars helps railroads help shippers. (Write: *Transportation Products Sales Department, Stran-Steel Corporation*, Dept. RLC, Stran-Steel Corporation, Detroit 29.)

6. VIBRATION MONITORING. 8-page bulletin (500-5) describes in detail the Model 5 Vibraswitch and how it is used to protect all types of rotating equipment against damage in case of failing bearings or other mechanical malfunctions. Control circuit and type selection details fully explained. (Write: *Beta Corporation*, Dept. RLC, Box 8625, Richmond 26, Va.)

7. COMPRESSOR TROUBLES. 4-page bulletin (PC-509 P) shows in cartoon sequence how to locate and correct common air-cooled and water-cooled compressor troubles—from failure to deliver air to excessive oil consumption. (Write: *Merchandising Sales Department, Worthington Corporation*, Dept. RLC, Harrison, N.J.)

8. POWDER CUTTING EQUIPMENT. 4-page folder (ADC 839A) covers complete line of metallic powder cutting equipment for cutting and washing stainless steels, other high-alloy steels and cast iron. Illustrates both vibratory and pneumatic type powder feeders and hand and machine torches. (Write: *Air Reduction Company*, Dept. RLC, 150 East 42nd street, New York 17.)

9. PROTECTIVE COATINGS. Protective Coatings Bulletin (760) presents painting data in the form of charts, tables, diagrams and illustrations. Section explains ATD hot spray paint system of protective maintenance, discusses also use of Tygorust as a primer for suty surfaces. (Write: *Plastics and Synthetics Division, U.S. Stoneware Company*, Akron 9, Ohio.)

10. FLUID POWER. "How Fluid Power Serves Industry and You," a 20-page booklet prepared by the National Fluid Power Association, describes the role fluid power plays in factories and on farms, in arteries of transportation, in homes etc. (Write: *Miller Fluid Power Division, Flick-Reedy Corporation*, Dept. RLC, 2040 N. Hawthorne, Melrose Park, Ill.)

11. DEGREASER AND BITE. Brochure describes Permacel 345 degreaser for cleaning auto, aircraft, diesel and marine engines, grease pits, etc., and Permacel 340 Bite, a pre-paint cleaner and wax and silicone remover. (Write: *Permacel Tape Corporation*, Dept. RLC, New Brunswick, N.J.)

12. LARGE NUTS. Complete buying manual lists specifications and prices of hex nuts, square nuts, and special nuts ranging in size from 1¾ in. up through 8 in. Describes also hot-forging processes used in making these large nuts, and includes decimal equivalents and hardness conversion tables for alloy steels. (Write: *Dept. P., Jos. Dyson & Sons, Inc.*, Dept. RLC, 5125 St. Clair avenue, Cleveland 3.)

13. TRANSPORTATION FINISHES. "Descriptive data on Transportation Finishes" contains complete information on drying, thinning, and properties of various finishes for all kinds of railway rolling stock, including enamels for diesel locomotives and Ferrolastic chemical resistant coatings for covered hopper and tank cars. (Write: *McDougall-Butler Company*, Dept. RLC, 2929 Main street, Buffalo 14.)

14. ELECTRICAL TAPES. Brochure describes qualities and applications of Permacel Vinyl tapes for resisting moisture, surface contamination, excessive heat, the discharge of surface electricity, and other causes of insulation failure. (Write: *Dept. T-2, Permacel Tape Corporation*, Dept. RLC, New Brunswick, N.J.)

15. RUST PREVENTIVE. 8-page booklet explains how and why Penetrol is effective as a rust preventive, paint extender, and reinforcing paint additive in general industrial, marine, automotive, and other fields. (Write: *Flood Company*, Dept. RLC, Hudson, Ohio.)

system and deep-domed pistons. Carburetors are of the heavy-duty industrial type. Self-regulated generators which of single bearing design, are close coupled to the engine and have top mounted exciters. *Caterpillar Tractor Company, Dept. RLC, Peoria, Ill.*

Nailing Machine

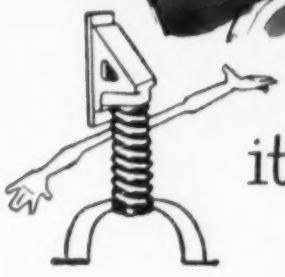
Tacks, nails, and screws, from ¼ in. to 3⅝ in., are fed and driven automatically at rates as high as 300 per min. by the POWASERT line of portable production equipment. The machine drives nails from 2 to 16 penny at any angle either in hard or soft woods. The gun comes in three sizes: small, for furniture manufacturers—11 in. long, weighing less than 5 lb; medium, for crating, box and pallet making, and other applications—14½ in., 6 lb 3 oz, and large, for the building and construction trades— 18½ in., 7 lb. All three guns can be used interchangeably with the automatic feeder which is mounted on a dolly. The gun, as well as the feeder, is air powered and nails are fed by air through a flexible tube. Users report driving up to 50 nails per min. *United Shoe Machinery Corporation, Dept. RLC, 140 Federal street, Boston 7.*

Low Alloy Welding Wire

This chrome-nickel-molybdenum alloy automatic welding wire, A-S-8620, with less than 2 per cent total alloy content is sympathetic towards practically all low alloys. It is particularly well suited for welding U.S. Steel's T-1 Steel, an alloy with very high physical properties—tensile strength 105,000-130,000 psi, elongation 15-20 per cent, and Rockwell hardness C20-35.

With the proper flux (submerged arc) on T-1 steel, the welding wire gives a tensile strength of 114,000-116,000 psi, elongation of 12-15 per cent and a Rockwell hardness of C28-30. Chemical analysis, as welded, is very close in all elements to the parent T-1 steel. Face and root bends show 100 per cent efficiency and there is no affected zone.

The welding wire is packaged in 100-lb coils, single paper-wrapped and in indi-



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. . . wants easy dismantling for various servicing operations, *fast* re-assembling, *low* labor costs. Barber Stabilized Trucks . . . simple in design and efficient . . . provide these advantages.

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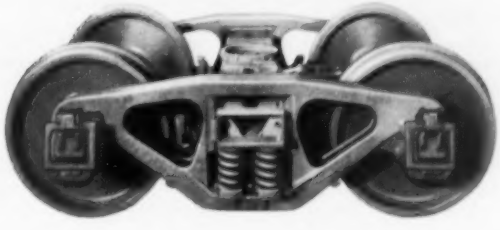

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Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

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Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

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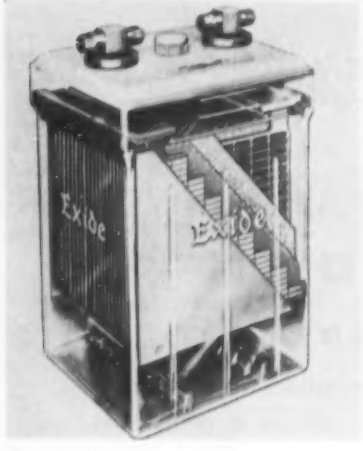
vidual fiberboard cartons. Larger quantities are palletized for ease of shipment. *Page Steel & Wire Division, American Chain & Cable Co. Dept. RLC., Monessen, Pa.*



Stationary Power Battery

Several product improvements and grid alloys introduced into the line of Tytex batteries are for stationary services, such as emergency lighting, signaling and telephone communication, etc. The manufacturer states that the improvements are expected to extend service life up to 10 per cent and reduce maintenance needs.

For the first time, these batteries include Silvium positive grids which are said to resist corrosion and withstand overcharging. Transparent containers, with covers sealed to prevent leakage and keep out dirt, are made of polystyrene, a heat-resistant material.

The design provides greater space between the plates and the top and bottom of the jar, increasing electrolyte volume. The units are available for stationary power field applications and are rated from 10 to 1064 amp-hr capacities. *Exide Industrial Division, Electric Storage Battery Company, Dept. RLC, Box 8109, Phila-*

Hacksaw

Special construction of the Leytool is said to permit many uses which are impossible with ordinary hacksaws. The device combines many of the features of hack, coping, and keyhole saws. Depth of cut is unlimited since the entire frame remains on the operator's side of the material.

The saw imported from England is made of diecast aluminum and English steel. Three hardened balls provide bearing surface against the top and both sides of the blade. The tool will take either 10-in. standard hacksaw blades. It measures only 5 in. by 16 in. by 1½ in. and weighs slightly more than 1½ lb. A pistol grip handle gives the operator complete control. *Hallbee Products Company, Dept. RLC, 461 Mill street, Parma, Mich.*

Iron Powder Electrode

This iron powder electrode, Easyarc 14, meets the proposed A.W.S. classification E6014. According to the manufacturer, the electrode has no tendency to "flat-top" and its smooth beads and easy slag removal make it particularly applicable for horizontal fillets.

The product operates very well on low open circuit voltage with ac transformers of the farm welder type. It is suitable for all types of mild steel fabrication, especially in vertical down welding of sheet metal and ornamental iron. *Air Reduction Sales Company, Division of Air Reduction Company, Incorporated, Dept. RLC, 60 East 42 street, New York 17.*

Prime Mover Malfunction Detector

This oil-tight and splash-proof detector anticipates trouble and shuts down rotating equipment before costly damage occurs. Malfunctions are instantly detected from slight increases in vibration.

Applications include gas and diesel engines, turbines, motor-generator sets and other rotating equipment. When mounted on an engine the device will detect a bearing failure, a bent shaft or rod breakage and instantly sound an alarm, or cut off the ignition, short the magneto circuits, or cut off the fuel supply with a solenoid valve.

The vibration responsive switch is adjustable over a wide range of normal vibration. It is enclosed in a gasketed box with an external reset operator which may be locking or non-locking. The unit is also furnished in an explosion-proof enclosure for hazardous locations. *Beta Corporation, Dept. RLC, Forest avenue at Ridge Road, Richmond 26, Va.*

Dow . . . industry's most complete line of chlorinated solvents

DOW

CHLOROTHENE cleans diesel locomotive armatures, electrical cabinets, generators, traction motors and many other parts.

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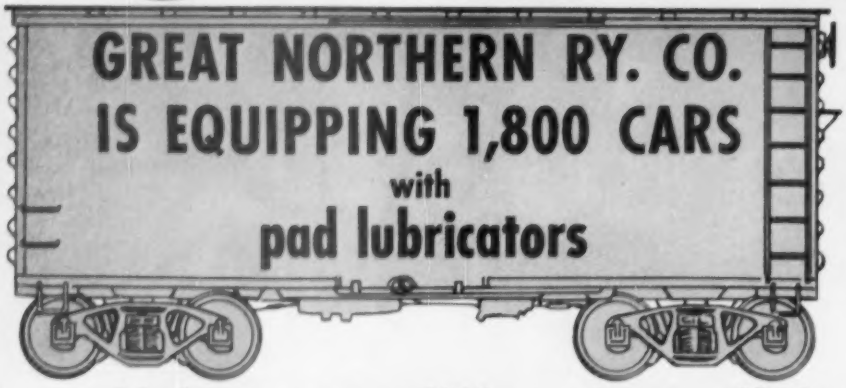

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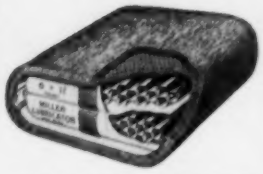

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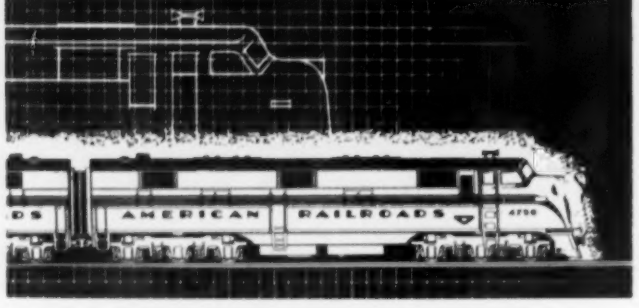

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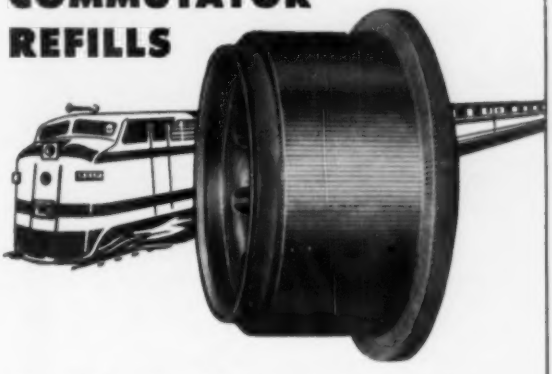

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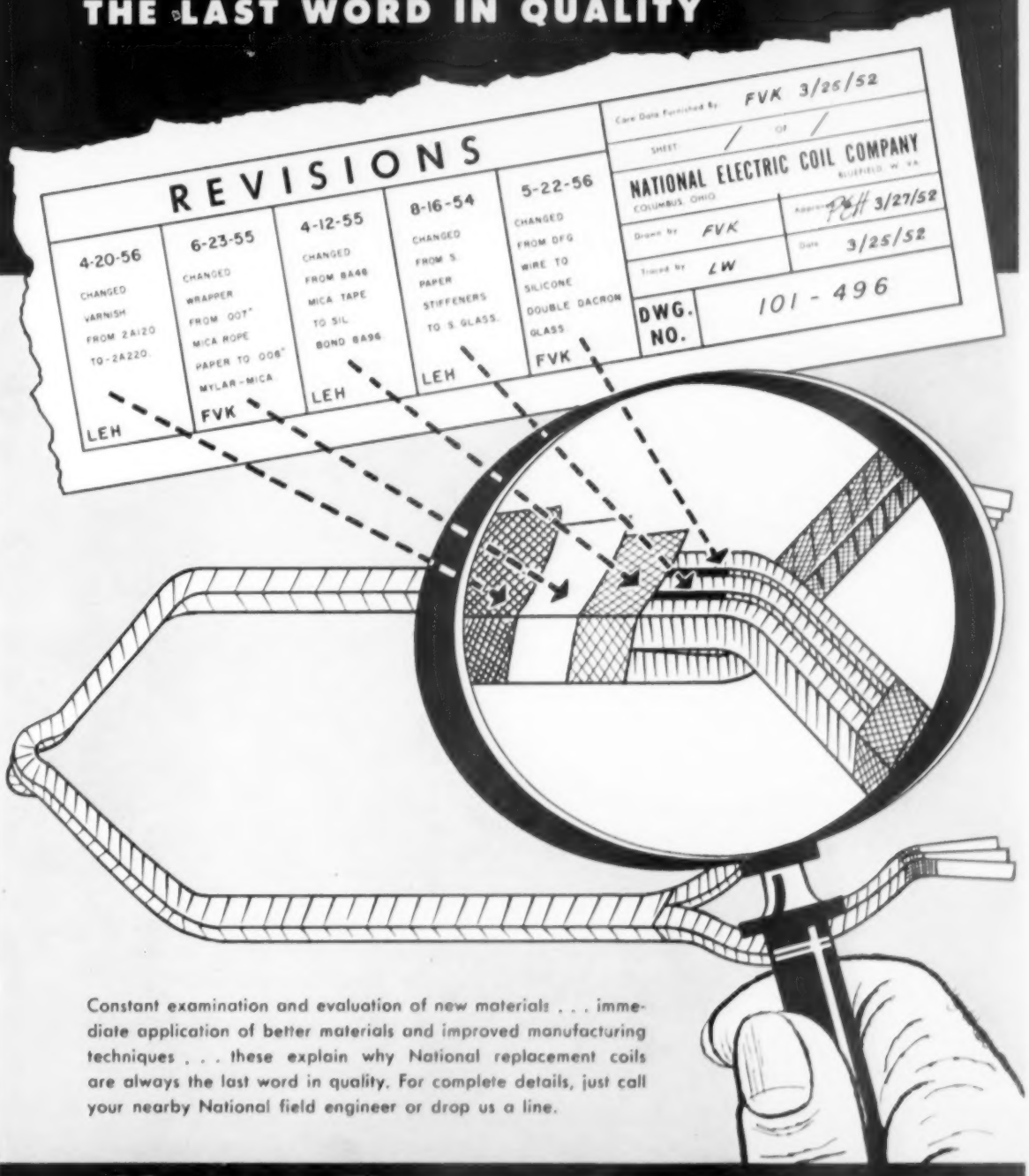

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THERE'S NO CURE WITH A "CRUTCH"

You can count on Timken® bearings to Cure the Hot Box problem

They pay for themselves over and over and over in operating and maintenance savings

YOU CAN'T COUNT on costly "crutches"—devices attempting to improve friction bearing performance—to cure the hot box problem. The only cure you can count on is Timken® bearings. They remove the *cause* of hot boxes—the friction bearing itself.

EXTRA DIVIDENDS

In addition to curing the hot box problem, Timken bearings bring *extra* savings. They wipe out the frequent inspection and lubrication that friction bearings require—even with "crutches"—to keep operating. Timken bearings cut terminal bearing inspection time 90%, lubricant cost as much as 95%. In fact, the new Timken heavy-duty type AP (All-Purpose) bearing assembly will go three years without the addition of lubricant. When all railroads go "Roller Freight", they'll save an estimated $224 million a year, earn about a 22% net annual return on the investment.

THE TAPER'S THE ANSWER

Timken bearings do away with the hot box problem because they *roll* the load instead of *sliding* it. There's none of the metal-to-metal sliding friction you get with friction bearings. And because of their tapered design, Timken bearings are the only ones you can count on to cure the hot box problem *and* bring costs down to lowest level. There's no lateral movement—the taper prevents it. Result: there's no pumping action, less lubricant is needed. There's no scuffing or skewing, bearings wear longer. And we make our own bearing steel, to be sure you get the finest, toughest steel available. No other American bearing manufacturer takes this extra quality control step.

When you figure in the extra cost of buying and maintaining "crutches" that never cure, the difference in price between friction and roller bearings is less today than ever. And by using a planned conversion program, a major American railroad shows how to reduce costs even further. Whenever a freight car of this road comes into its shops for major repairs, it is converted to roller bearings. This method makes it easier to maintain a steady shop and labor schedule, keeps bearing installation costs to a minimum. And it makes it easier to spread the conversion cost over a period of years.

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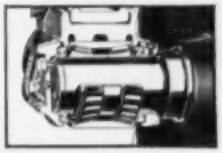
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